

**A P P E N D I X    A**

**HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS SUMMARY**

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**DATA SOURCE INDEX**

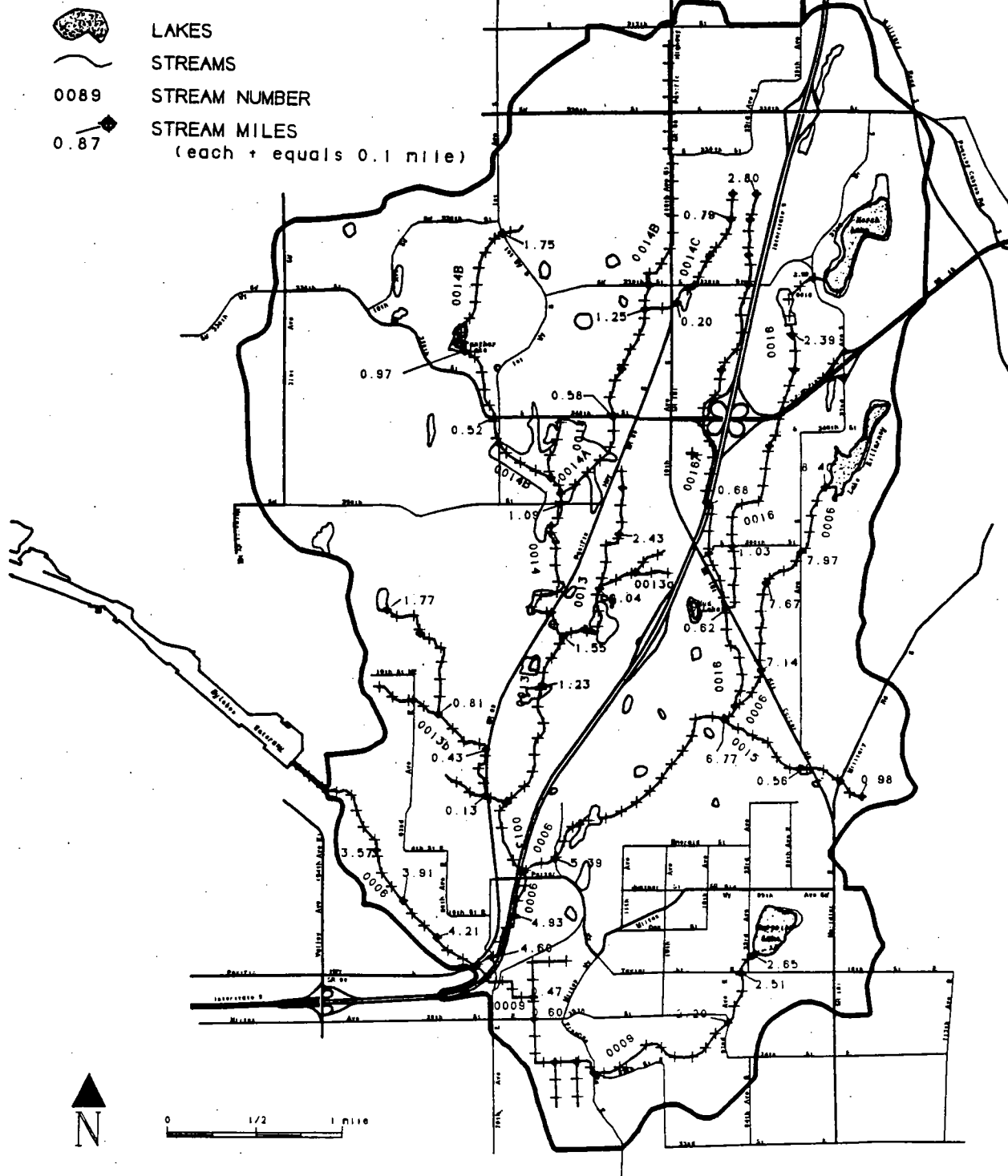
- P 1985 and 1988 aerial photos observation**
- R Reconnaissance Program Observation**
- S Basin Planning Staff Observation**
- M Metro Observation Report**
- K King County Conservation District Observation**
- DI SWM Drainage Investigation Observation**
- C Citizen Observation**

**KEY TO WATER QUALITY CONDITIONS**

- \* = sampling location identifier**
- NO<sub>3</sub> + NO<sub>2</sub> = Nitrate + Nitrite - Nitrogen**
- TP = Total Phosphorus**
- Cu = Copper**
- Pb = Lead**
- Zn = Zinc**
- TSS = Total Suspended Solids**
- Fecal = Fecal Coliform Bacteria**

Figure A.1

# HYLEBOS CREEK BASIN STREAM MILES MAP



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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
1	See Item 47.1, Lower Puget Sound Basin Observed Conditions Report					
1.1		0006 RM 0.0	Habitat <sup>4</sup>	S	Patches of good intertidal habitat on aquatic lands owned by the Puyallup Tribe. Beach seining has shown this area to be highly productive juvenile salmonid habitat. Areas closest to Commencement Bay have eelgrass and unvegetated sand flats grading into low and high salt marshes.	Port of Tacoma
1.2		0006 RM 0.2-2.8	Habitat Water Quality Land Use	S	Intertidal habitat within much of the remainder of Hylebos Waterway and its riparian corridor is highly degraded due to industrial land uses (e.g., log storage, marinas, chemical refineries, wrecking yards), shoreline filling, and shoreline debris (metal scrap, tree bark, bricks, asphalt, cement and marine plastic debris, etc.). Habitat within the waterway is disturbed by regular dredging for ship passage.	Port of Tacoma/ Tacoma
1.3		0006 RM 2.80	Water Quality Land Use	S	Toxic leachate and surface runoff (wood waste/arsenic residue) from EPA Superfund site.	Tacoma
1.4		0006 RM 3.41	Habitat Geology	S	Strong tidal influence; this low-gradient reach is a deposition area for fine sediment. Good emergent and canopy vegetation, and undercut banks provide shading and cover for fish, and good habitat for waterfowl, songbirds, and small mammals.	Pierce County

<sup>1</sup> Item Numbers - whole item numbers refer to entries from the 1986-1987 King County Basin Reconnaissance Program. Entries designated with a decimal number supplement and update the Reconnaissance Program.

<sup>2</sup> See Figure A.1 for river mile map.

<sup>3</sup> RM for Tributary 0006 begins where Hylebos Waterway empties into Commencement Bay in 3E-T21W-S27N.E.

<sup>4</sup> Habitat refers to fish and wildlife habitat.

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1.5		0006 RM 3.85	Hydrology	S	Flooding of road and several homes during 1/9/90 storm at 8th St. E. crossings. Tidal influence contributes to flooding.	Pierce County
1.6		0006 RM 3.91	Hydrology	S	Local flooding of road and homes at 62nd Ave. E. during 1/9/90 storm.	Pierce County
1.7		0006 RM 4.49-4.87	Habitat Land Use Geology	S	Stream channelization and encroachment into riparian corridor caused by adjacent SR 99; no right bank canopy or bank vegetation. Lower banks armored with concrete pillows; piles of loose sand deposited along roadside during SR 99 guard rail replacement are sliding into stream. Freshwater mussel beds present.	Pierce County
1.8		0006 RM 4.55-5.15	Habitat Land Use Geology	S	Riparian habitat is limited due to past channelization and lack of bank and canopy vegetation. Dominant bank vegetation is reed canary grass. This low-gradient reach is a natural deposition area for fine sediment from upstream sources; substrate is >95% sand and silt; channel is generally devoid of LOD.	Pierce County/ Milton
1.9		0006 RM 4.55-4.65	Habitat Land Use	S	Encroachment into riparian corridor and floodplain due to filling of adjacent wetland to construct heavy equipment storage lot. Adverse impacts include channel dredging, armoring of right bank with ecology blocks, and habitat disturbance caused by repeated collapse of blocks into stream.	Pierce County
1.10		0006 RM 4.48-5.39	Hydrology	S	Flooding of business and residence along the E. side of I-5 from where trib. 0006 crosses 5th Ave., south to where I-5 turns W. Channel conveyance capacity reduced due to sedimentation (primarily sand and silt). Industrial park east of I-5 flooded. Filling in floodplain periphery.	Pierce County/ Milton

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1.11		0006 RM 5.05	Habitat Land Use	S	Encroachment into riparian corridor and floodplain due to filling of adjacent wetland to construct truck parking lot.	Pierce County/ Milton
1.12		0006 RM 5.10 Undefined Ditch (QHDD)*	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, NO <sub>3</sub> + NO <sub>2</sub> , and fecal densities during storm events. Potential sources include: fertilizers, automobile and truck roadway runoff, two businesses bordering ditch (Truck Repair/Rental), and wildlife. Potential effects could include eutrophication, reduced spawning success downstream, toxicity to freshwater and marine aquatic species.	Milton
1.13		0006 RM 5.15	Habitat Water Quality Land Use Geology	S	Chronic erosion around bridge abutments during peak flows. Erosion and undercutting of banks noted in channel.	Milton
2		0006 RM 5.15-5.30	Habitat	R	Tides affect water level. Low gradient. Large amount of sand being deposited.	Milton
3	No entry					
3.1		0006 RM 5.20-5.35	Habitat Land Use	S	Encroachment into floodplain due to filling for equipment storage lots.	Milton
3.2		0006 RM 5.29 (QEH1)	Water Quality	M	NO <sub>3</sub> + NO <sub>2</sub> concentrations higher than routinely monitored King County streams during baseflow conditions. No sample for dissolved oxygen (DO), temperature, and pH exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period.	Milton
3.3		0006 RM 5.29 (QEH1)	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, and fecal densities during storm events. Potential sources include: fertilizers, construction activities, auto wrecking yard, automobiles,	Milton

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					falling onsite septic systems, sewerline leaks, and wildlife. Potential effects could include: eutrophication, reduced spawning success, toxicity to both fresh-water and marine aquatic species, and reduced recreational activities.	
4		0006 RM 5.30	Geology	R	Minor erosion and undercutting of banks noted in channel. Some undercut blocks have failed or are falling into stream. Channel cut into peat. Riprap next to yard suggests erosion problem. Recent aggradation of sand in channel, possibly due to upstream quarry pit.	Milton
4.1		0006 RM 5.3-6.7	Water Quality Habitat	S	On 12/13/89, 47 moribund and dead yellow perch; unknown cause; one live and five dead adult coho (dead fish appeared to have spawned out); oil sheen in pool at RM 5.5; numerous signs of wildlife (e.g., racoon, great blue heron, and coyote tracks).	Milton/ King County
4.2	(formerly 5)	0006 RM 5.33	Geology	S	Fresh infinite slope failure on side-slope exposes sand and gravel. Failure is approx. 60 inches from channel. No cause noted. Cause not investigated, but may be construction-related.	Milton
4.3	H1	0006 RM 5.39	Hydrology	S	72 inch cmp filled 1.8 feet of sediment at 5th Ave. on 2/28/90.	Milton
4.4		0006 RM 5.41	Geology	S	Channel size: 1.5 m X 0.60 m.	Milton
5	(see 4.2)					
6		0006 RM 5.48	Geology	R	Undercutting of banks and failure of undercut banks into channel. Channel is still cut into peat.	Milton
7		0006 RM 5.40-5.75	Habitat	R	Riverine wetland and floodplain. Old road washout at RM 5.75.	Milton

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7.1		0006 RM 5.6-6.7	Habitat Land Use Geology	S	Moderately good habitat structure; numerous patches of good spawning and rearing habitat (riffles with appropriately-sized gravels and small pools). Generally adequate LOD; good canopy and bank vegetation. Worsening habitat upstream: patches of moderately cemented gravels with excessive interstitial sand; slight to moderate downcutting (0.5 to 2 feet), bed scour and deposition of coarse sediment due to excessive peak flows; unstable woody debris jams (some may cause intermittent passage blockages); tires and car bodies in stream; ORV tracks conveying mudflow and human disturbance into stream.	Milton/ King County
8		0006 RM 5.65	Geology	R	Undercutting of banks and failure of undercut banks into channel. Channel is still cut into peat.	Milton
9		0006 RM 5.75	Geology	R	Old road crosses channel. Culvert placed to pass streamflow is plugged crossing is washed out. Till exposed in cuts on both banks.	Milton
10		0006 RM 5.77	Geology	R	Large slump on left sideslope. Heavy seepage, hummocks with trees tilted at base. No evidence of recent movement.	Milton
11		0006 RM 5.90	Geology	R	Numerous bank cuts expose sand. Floodplain 50-100 feet wide. Stream meanders from toe of one to slope of another. Morphology suggests common old slumps.	Milton
12		0006 RM 5.95	Habitat	R	Debris in stream. Possible fish blockage.	Milton
12.1		0006 RM 6.30	Geology	S	Channel size: 4.5 m X 0.50 m. Local bank incision to 3 feet.	King County
13	No entry					
14	No entry					



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15		0006 RM 6.30	Habitat	R	Habitat in fairly good condition. Incised tributary comes in from west.	King County
16		0006 RM 6.50	Geology	R,S	Large slump on left side with depression formed at top. Possible evidence of recent small movement.	King County
16.1		0006 RM 6.70-6.91	Habitat	S	Excessive peak flows have caused moderate downcutting (2 to 4 feet) channel widening, deposition of coarse sediment, filling in of pools, and formation of large woody debris jams (some may cause intermittent passage blockages). Many tires in stream.	King County
17		0006 RM 6.70	Geology	R,S	Bank erosion on both sides of channel. Width of floodplain is 50 feet. Channel dimensions 5 m X 0.5 m.	King County
18		0006 RM 6.70	Habitat	R	Habitat in good shape. Nice spawning gravel.	King County
19		0006 RM 6.75	Habitat	R	Newly incised channel. No habitat for fish or benthic organisms.	King County
20		0006 RM 6.77	Geology	R,S	Trib. 0006 forms intersection with 0016 with 0006 being a small tributary that continues up main channel. Heavy bank and channel erosion in 0006, with inci- sion up to 6 feet.	King County
20.1		0006 RM 6.81	Geology	S	Channel size: 3.5 m X 0.70 m. Local bank incision to 2 feet; stream gravels cemented with fines.	King County
20.2		0006 RM 6.91	Habitat	S	FWSWD access road, pipe, and manhole in stream.	King County
21		0006 RM 7.10	Geology	R,S	Heavy bank erosion. Stream is dropping off till plain at this point. Channel dimensions 2.0 m X 0.20 m.	King County
21.1		0006 RM 7.14	Hydrology	S	During 1/9/90 storm, discharge from this trib. flowed north along SR 99 and entered trib. 0016 that overflowed into trib. 0016A.	King County

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21.2		0006 RM 7.19	Habitat Land Use	S	Encroachment into riparian corridor caused by dumping of fill and yard debris on left bank.	King County
21.3		0006 RM 7.25-7.65	Habitat Land Use	S	Encroachment into riparian corridor due to channelization through residential yards and landscaping of streambanks.	King County
21.4		0006 RM 7.33	Geology	S	Stream is silt- and sand-choked.	King County
21.5		0006 RM 7.60	Hydrology Water Quality	S	Small asphalt-lined pond in old plat at 24th Place and 25th Avenue South drains to stream through 24" culvert. Pond appears to be undersized and lacks any kind of shade or biofiltering vegetation.	King County
21.6		0006 RM 7.75	Habitat Geology	S	Streambed consists of silt and patches of small cemented gravels.	King County
22		0006 RM 7.90-8.40	Geology Hydrology Land Use	R	Outlet from Lake Killarney. No flow and no discernible channel. Lower half of reach is bounded by single-family developments with on-site detention systems, which appear to be functioning.	King County
23	No entry					
23.1		0006 Lake	Habitat Land Use	S	Although substantial forested areas remain around Lake Killarney, more than 40% of the lake's former lacustrine and remnant bog wetlands have been eliminated during residential shore line development. The lake supports waterfowl, bass, perch, and rainbow trout.	King County
23.2	H7	<u>Off Channel Lake</u>	Hydrology	DI 89-0247 89-0194 87-0640	Flooding over S. 351st St. & 352nd St. at 28th. - 30th Ave. S., draining to Lake Killarney.	King County
23.3	H7	<u>Off Channel Lake</u>	Hydrology	DI 89-0299	Drainage from 34th Ave. S. at S. 354th St. flowing on private property, draining	King County

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					to Lake Killarney.	
23.4		0009 RM 0.0-0.05	Habitat Hydrology	S	Golden Rule Motel encroaches into riparian corridor; chronic ingestion of riparian vegetation by goat tethered on left bank. Motel flooded during 1/9/90 storm.	Pierce County
23.5		0009 Lake	Habitat Water Quality	S	Vegetation has been removed along 90 to 95% of the Surprise Lake shoreline; most remaining native growth is in a thin strip less than 25 feet wide, except for a patch of scrub-shrub vegetation at the south end of the lake. Residential development on shoreline has been accompanied by placement of compacted fill in former lacustrine wetlands. Foot trail less than 50 feet from shoreline in new apartment complex near south end of lake. Lake provides a modest amount of habitat for waterfowl, although runoff of avian feces from lawns is a source of excess nutrients.	Milton
24	No entry					
24.1		0013 RM 0.03-0.06	Habitat	S	Freshwater mussel bed (under I-5).	
24.2		0013 RM 0.05 (QWH1)	Water Quality	S	Relatively high concentrations of NO <sub>3</sub> + NO <sub>2</sub> , TP, TSS, Cu, and fecal densities during storm events. Potential sources include: fertilizers, agricultural runoff, automobiles, farm animals having access to creeks, failing on-site septic systems, sewerline leaks, wildlife and waterfowl. Potential effects could include: eutrophication, and nuisance growths of algae, reduced spawning success, toxicity to freshwater and marine aquatic species, and reduced recreational activities.	
25		0013 RM 0.10	Geology	R	Stream in wetland area. Channel scour and bank erosion noted. Evidence of	Milton

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					flows four feet above existing water level. Probably some tidal influence.	
26		0013 RM 0.10	Habitat	R	Habitat in good condition. Some fresh-water clams. Exposed roots indicate minor bank erosion.	Milton
26.1		0013 RM 0.20-0.65	Habitat	S	Dense overhanging and moderate canopy vegetation along most of this reach limit intrusion into riparian corridor. Wetlands along both banks perform flood storage, biofiltration, and wildlife habitat functions.	Milton/ Federal Way
27		0013 RM 0.30	Habitat	R,S	Exposed roots indicate minor bank erosion. Considerable amount of sand settles out in bedload. Channel dimensions 2.0 m X 0.80 m.	Milton
27.1		0013 RM 0.32	Hydrology Habitat	S	Local flooding of Birch St. crossing during 1/9/90 storm. Sedimentation of channel (mostly sand) severely reduced conveyance. Emergent and scrub-shrub wetlands are providing wildlife habitat, biofiltration, and flood storage.	Milton
27.2		0013 RM 0.34	Habitat Land Use	S	Filling of wetland adjacent to stream behind Bingo dome parking lot is causing loss of flood storage and biofiltration.	Milton
28		0013 RM 0.40-0.90	Geology	R	Evidence of channel scour.	Milton/ Federal Way
28.1		0013 RM 0.44-0.85	Habitat Geology	S	This reach contains the best rearing habitat in the Hylebos system, as well as excellent wildlife habitat. Abundant LOD, overhanging banks, and luxuriant bank and canopy vegetation maintain bank stability and provide cover for fish and wildlife. Numerous snags (some quite large) are present within and upslope from adjacent wetland. Local residents report sightings of great blue heron, woodpecker spp.,	Milton/ Federal Way

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					pheasant and grouse, waterfowl, coyote, skunk, and other small mammals. Streambed substrate in this low-gradient reach is largely sand and silt, with occasional patches of fine gravels. Habitat threats include scouring during peak stormflows, and sedimentation of pools.	
28.2		0013 RM 0.50	Habitat	S	Freshwater mussel bed.	Federal Way
28.3		0013 RM 0.70	Geology	S	Channel dimensions: 4.0 m X 0.5 m.	Federal Way
29		0013 RM 0.90-1.20	Habitat	R	Good spawning gravel. Seven dead salmon observed.	Federal Way
29.1		0013 RM 0.96	Geology	S	Channel dimensions: 3.5 m X 0.4 m.	Federal Way
30		0013 RM 1.00	Geology	R	Evidence of channel scour and bank erosion. Some destabilization of steep sideslopes above channel due to erosion at toe of slope.	Federal Way
30.1		0013 RM 1.10-1.20	Habitat Water Quality Land Use Geology	S	Severe bank trampling and overgrazing by cattle in adjacent wetland. Good canopy vegetation in lower end, little canopy vegetation in upper end, and little bank-vegetation throughout. Salmon spawning habitat is being silted in, and water quality is chronically impaired by turbidity and high fecal coliform counts.	Federal Way
30.2		0013 RM 1.10-1.30	Habitat Water Quality Land Use	S	Contains degraded salmonid spawning habitat, but is almost devoid of rearing habitat. Approximately 50 chum salmon observed spawning in fall 1987; smaller numbers were observed in 1989. Habitat is limited by past channelization and dredging, paucity of bank and canopy vegetation, and absence of LOD. Channel stability and capacity are	Federal Way

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					severely compromised due to lack of riparian vegetation and extreme sediment deposition from upstream sources during 12/5/89 and 1/9/90 storms. Oily sheen and odor noted by local residents during 1/9/90 storm; possible source Boy Scout property at RM 2.50.	
30.3		0013 RM 1.20	Hydrology	S	Stream channel silted in with sand and gravels.	Federal Way
31		0013 RM 1.20-1.50	Habitat	R	Stream passes through pastures with overhead canopy removed. Animals eroding bank in places. Sand in bedload. One dead salmon observed.	Federal Way
31.1		0013 RM 1.22 Undefined Ditch (QHDD)*	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, and fecal densities during storm events. Potential sources include: fertilizers, agricultural runoff, landfill activities, automobiles, and farm animals having access to creek immediately upstream. Potential effects could include: eutrophication, reduced spawning success, toxicity to freshwater aquatic species, and reduced recreational activities.	Federal Way
31.2		0013 RM 1.23	Hydrology	S	Area of chronic flooding. During the 1/9/90 storm at 373rd St. bridge. Water overtopped the road, flooding a residence upstream, and a pasture downstream. Diminished channel capacity due to sedimentation.	
31.3		0013 RM 1.23 (QWH3)	Water Quality	M	Temperatures were higher than other stations in the basin during baseflow conditions. TSS concentrations were higher than in other routinely monitored areas in King County. No sample for DO, temperature, pH, and fecal coliform exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period.	Federal Way

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32		0013 RM 1.50-2.00	Habitat	R	Good habitat. Two dead salmon. Wetland at approx. RM 2.00. Fill being dumped off east side of SR 99. No encroachment in wetland.	Federal Way
32.1		0013 RM 1.50	Hydrology Geology	S	Local flooding during the 1/9/90 storm. Severe gravel and debris deposition from the storm.	Federal Way
33		0013 RM 1.60-1.90	Geology	R	Channel scour and bank erosion into floodplain deposits.	Federal Way
33.1		0013 RM 1.70	Geology	S	Channel dimensions: 3.0 m X 0.35 m. Very boggy.	Federal Way
33.2		0013 RM 1.74-1.94	Habitat Geology	S	Runoff and chronic deposition of sediment from I-5 runoff via ditch along 12th Avenue S. has eliminated much of the former chum, coho, chinook, and steelhead spawning habitat and is reducing rearing habitat (pools) at this location. Steelhead have been absent since a fish kill in 1985.	Federal Way
33.3		0013 RM 1.94-2.40	Habitat Geology Land Use	S	The only segment of the Hylebos system with both spawning and rearing habitat. Bank and canopy vegetation, and LOD are generally very good throughout and maintain varied instream and riparian habitat for fish and wildlife. Stream buffered by a large adjacent wetland fed by a number of small, perennial springs. A large wetland parcel between 359th Street, 364th Street, and the Lloyd fill on SR 99 is on the King County Open Space Program acquisitions list. Part of the wetland has been evaluated by the Corps, and was assigned a preliminary wetland inventory number by the County (Hylebos Wetland #46A). The Puyallup Tribe supports permanent protection of wetlands and possible future siting of a small hatchery and interpretive center.	Federal Way

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					Threats to instream habitat include scouring, sedimentation, and filling in of pools during storms. Past damage to the wetland from filling east of SR 99, and north and south of 359th Street by FWSWD to install a pump station (the pump station was excavated in active springs) and sewer lines; and the large Lloyd Enterprises fill on SR 99. Future threats to the wetland include proposed expansion of the Lloyd fill, increased sedimentation and frequency of inundation by stormwater, and a decline in groundwater recharge. Local residents report that flow in local springs seems to have dropped in recent years.	
33.4		0013 RM 2.00	Geology Habitat	S	Stream gravels heavily packed with fines.	Federal Way
33.5		0013 RM 2.05	Geology Habitat	S	Channel dimensions: 2.0 m X 0.30 m. Silt infiltrated into stream gravels.	Federal Way
33.6		0013 RM 2.10	Water Quality	S	Suds above 359th St. Observed 1/88.	Federal Way
33.7		0013 RM 2.25	Geology Habitat	S	Much silt in stream gravels.	Federal Way
34		0013 RM 2.30	Geology	R	Logging debris in stream channel. Channel appears stable.	Federal Way
35	No entry					
36		0013 RM 2.30-2.60	Habitat	R	Sudsy, gray, foul-smelling water, indicating pollution. Streambank experiencing slight erosion. Sources are SR 99 and probably truck stop nearby.	Federal Way
36.1		0013 RM 2.43	Hydrology Geology Habitat	S	Creek overtopped 359th St. undermining 10' of fill under street washing out 80% of the road during the 1/9/90 storm. 18" culvert became blocked	Federal Way



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					with debris. Riparian and instream habitat was badly damaged by blowout of road fill and collapse of large trees. Road construction will also reconstruct and revegetate riparian habitat 200 feet downstream of 359th St.	
37		0013 RM 2.70	Geology	R,S	Suds in stream indicate pollution. Stream drains SR 99. Channel appears stable.	Federal Way
37.1		0013 RM 2.80	Hydrology	S	New private R/D facility (Welters Pond) malfunctioned during the 1/9/90 storm. Outlet control structure was not yet anchored when the storm event occurred. Erosion control facilities for fill onsite failing. Stream is piped from pond inlet upstream along 351st to underground tank in Costco parking lot.	Federal Way
37.2		0013 RM 2.88 (QWH6)	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, Zn, and fecal densities during storm events. Potential sources include: truck wash, roadway runoff, construction activities associated with properties immediately upstream (e.g., Costco), automobiles, and sewerline leaks. Potential effects include: eutrophication, nuisance growths of algae, reduced spawning success, toxicity to freshwater aquatic species, and reduced recreational activities.	Federal Way
37.3		0013 RM 2.90 (QWH7)	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, Pb, Zn, and fecal densities during storm events. Potential sources include: truck wash, roadway runoff, construction activities associated with Costco and other properties upstream, automobiles, and sewerline leaks. Potential effects include: eutrophication, nuisance growths of algae, reduced spawning success downstream, toxicity to freshwater	Federal Way

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					aquatic species, and reduced recreational activities.	
37.4		0013 RM 2.96	Water Quality	S	Silt and other deleterious materials from a concrete company and other commercial land uses upstream are visible in the out-fall of the culvert on the east side of SR 99.	Federal Way
37.5		0013 Undefined Channel	Hydrology Habitat	DI 88-0393	A 53 gallon drum with holes and overflow placed in stream, also in stream diversion piping water to a bird bath in vicinity of S.W. 374th St. & 2nd Ave. S.	Federal Way
37.6		0013B RM 0.00-0.81	Hydrology Geology Habitat	S	Peak flows during 1/9/90 storm caused severe downcutting, erosion, and streambed scouring. Two feet of sand and silt deposited at the mouth of the stream decreased local channel capacity. Large sediment accumulation in flume of culvert under Spring Valley Trailer Park on SR 99 & 377th St. clogged pipe and caused high volume overland flow accompanied by sediment deposition and flooding in trailer park and adjacent property to the north, and washed out portion of road bed on east lane of SR 99. Stream appears to be perennial in lower reaches; sculpin and crawfish found in trailer park one day after the storm.	Federal Way
37.7		0013B RM 1.77	Habitat	S	Headwaters originate within Hylebos Wetland #21.	Federal Way
37.8		<u>Off Channel</u>	Hydrology	DI 89-0728	Flooding at intersection of 5th Ave. S.W. & 371st St.	Federal Way
37.9	WH3	<u>Off Channel</u>	Hydrology	C	Localized flooding at S. 344th St. and 18th Pl. S. during the 1/9/90 storm.	Federal Way
37.10	WH3	<u>Off Channel</u>	Hydrology	C	Localized flooding in vicinity of S. 346th St. (extended) E. of SR 161 during the 1/9/90 storm.	Federal Way

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37.11		0014 RM 0.00	Hydrology	S	Localized flooding at confluence with trib. 0013 during the 1/9/90 storm.	Federal Way
38		0014 RM 0.00-0.15	Geology	R	Bank erosion noted along much of the channel. Erosion is cutting into floodplain deposits approx. one foot high. Channel dimensions 2.5 m X 0.25 m.	Federal Way
39		0014 RM 0.00-0.20	Habitat	R	Good gravel for spawning from RM .00-.15. Five salmon observed. Lots of pools and riffles.	Federal Way
40		0014 RM 0.15-1.04	Hydrology	R	Lower reach is in good hydraulic condition due to natural R/D and water quality filtration provided by Hylebos Wetland 2418. Flooding due to increased peak flows from upper basin development has been reported in recent years.	Federal Way
40.1		0014 RM 0.19-0.25	Habitat Hydrology	S	Stream and natural floodplain area has been modified by land owner into trapezoidal channel with riprap banks to increase channel capacity. Instream and riparian habitat is limited by removal of bank vegetation (especially on the right bank) partial removal of canopy vegetation, and channel riprapping. Other adverse conditions include lack of LOD and pools, chronic deposition of unsuitably large sediment from upstream sources, and streambed scouring during peak flows. The landowner proposes additional channel excavation and widening to prevent future flooding of school buildings. Adjacent Hylebos Wetland #22 (1.8 acres) provides good wildlife habitat and a modest amount of flood storage. Channel overflowed onto school grounds and undercut channel armor during the 1/9/90 storm.	Federal Way
40.2		0014 RM 0.40	Geology	S	Channel dimensions: 3.0 m X 0.30 m.	Federal Way

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40.3		0014 RM 0.47-0.57	Habitat Land Use	S	Inadequate bank and canopy vegetation, especially along the left bank; encroachment into riparian corridor by debris behind abandoned house.	Federal Way
40.4		0014 RM 0.57-0.76	Habitat Geology	S	Runs through a broad, secluded ravine flanked by 40-80% slopes lined with mature cedar, hemlock, big leaf maple and alder. Good to excellent bank and canopy vegetation and ample LOD maintains a series of small step pools that serve as rearing habitat, however sediment is generally too coarse to serve as spawning habitat. Habitat was damaged during the 1/9/90 storm by mass wasting from walls of ravine and severe downcutting which released large amounts of gravel and cobble, and contributed to extensive scouring and sediment deposition throughout the riparian corridor for at least a mile downstream. Good wildlife habitat.	Federal Way
40.5		0014 RM 0.95-1.71	Habitat Land Use	S	Bank trampling by livestock; pastures and yard are encroaching into riparian corridor; canopy and bank vegetation fair to poor; inadequate LOD.	Federal Way
40.6		0014 RM 1.04-1.06	Habitat	S	Encroachment into riparian corridor due to removal of left bank trees and deposition of slash in stream. The streambed consists almost entirely of silt with patches of small, cemented gravel.	Federal Way
41		0014 RM 1.09	Habitat	R,S	Some sand moving down system in bed load. Area has been clearcut, including stream sides.	Federal Way
41.1		0014 RM 1.09 (QWH8)	Water Quality	M	Dissolved oxygen concentrations were lower than other stations in the basin and other routinely monitored King County streams during baseflow conditions. Fecal densities exceeded DOE criteria 4	Federal Way

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					times (33%) during baseflow monitoring. No sample for temperature or pH exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period.	
41.2		0014 RM 1.09	Hydrology	S	Severe flooding at 356th St. overtopping the road during the 12/5/89 and 1/9/90 storms.	Federal Way
42		0014 RM 1.50	Hydrology	R	Existing R/D lakes servicing this portion of West Campus appear to be functioning quite adequately as is evidenced by lack of problems at outlet at S. 348th St. Substantial landscape buffers also contribute to lack of drainage problems.	Federal Way
42.1	WH4/WH7	<u>Off Channel</u>	Hydrology	DI 90-0087	Water nearly flooded a home at 11th Ave. SW & SW 356th St.	Federal Way
41.2	WH4	<u>Off Channel</u>	Hydrology Water Quality	DI 86-01F4	Drainage with animal wastes from barn flowing into drainage ditch on 6th S.W. at S.W. 363rd St.	Federal Way
41.3	WH4	<u>Off Channel</u>	Hydrology	C	Storm water 6-8' deep flooded ravine area in vicinity of 356th St. and 6th Ave. S. during the 1/9/90 storm. No roads flooded.	Federal Way
43		0014A RM 0.00-3.0	Hydrology	R,S	Reach contributed the greatest portion of increased flows to west Hylebos system. Improvements to Pacific Hwy. S. storm system have aggravated the erosion problems in the lower reach north of S. 348th St. RM 1.10 is severely impacted by clearing and grading; natural R/D in area has been eliminated due to removal of two small culverts which drained the wetland. In 1985, wetland had been logged, scraped, ditched, and drained. Severe erosion on site from upstream runoff. Some debris present. Loss of natural stormwater storage is creating erosion and sedimentation problems downstream. Severe siltation of downstream due to steep bank cuts.	Federal Way

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					Heavy deposition of gravel at and below below confluence with trib. 0014C. This is the site of the north and south pond of the 336th Street stormwater capital improvement project, and the reconnaissance proposal for regional R/D facility	
43.1		0014A RM 0.00-0.23	Habitat Geology	R,S	Encroachment into riparian corridor due to removal of left bank trees and deposition of slash in stream. The streambed consists almost entirely of silt with patches of small, cemented gravel.	
43.2		0014A RM 0.20	Habitat Water Quality Land Use	S	Trash in stream (barrels, tires, and other debris); encroachment into the riparian corridor due to filling of lot on SR 99 with illegal materials (woody debris); runoff of fertilizers and possibly pesticide residues enters stream through ditch draining dump behind Chem Lawn.	
43.3		0014A Lake	Hydrology Habitat	DI 88-0480	Brook Lake control removed, drying up the lake. Lake bottom filled with sedi- ment that is level with the invert of 24-inch pipe at control structure.	
43.4		0014A Lake	Habitat Geology	S	Because of its relative seclusion and good water quality, Brook Lake and surrounding forest contains locally significant wildlife habi- tat. Coho formerly reared in the lake and in a short stretch of 0014A north of the lake; rainbow trout are still present. Littoral habitat is very good along the north and west shoreline where the lake borders the future West Hylebos State Park. Bank and canopy vegetation are also good on the north and west sides of the lake, but habitat encroachment along the remainder of the shore- line has occurred due to past wetland filling and removal of shoreline vegetation. The fishway at the outlet may be impassable water may cause fish to jump out	

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					under certain flow conditions. Habitat value within the lake is by sediment deposition from upstream impervious services. The lake underwent uncontrolled drainage in 1986(?) due to failure of the outlet structure, followed by dredging. These activities resulted in siltation of the streambed for a considerable distance downstream in 0014.	
44		0014A RM 0.35	Geology	R,S	Heavy gravel deposition in streambed and moderate streambank erosion indicate high peak flows.	Federal Way
45		0014A RM 0.35-0.50	Habitat	R	Large amounts of debris and gravel in stream. At RM .50 stream is ditched with steep sideslopes and no vegetation (major erosion potential). Wetland found just south of S. 348th Street.	Federal Way
45.1		0014A RM 0.40	Habitat Land Use	S	Hung culvert under access road to FWSWD pump station. Pump station appears to have been built on fill placed several feet from the stream within Hylebos Wetland #18. This passage barrier defines the upper limit of anadromomous fish use on this tributary.	Federal Way
45.2		0014A RM 0.40-0.47	Habitat	S	Habitat within and above this reach and is limited by extreme streamflow variability.	Federal Way
45.3		0014A RM 0.48-0.57	Habitat Geology Land Use	S	Encroachment into riparian corridor by wetland filling during construction of the Metro Park-and-Ride lot south of 348th St. South, and construction of several small sedimentation ponds nearby, which appear to be ineffective in detaining flows or trapping sediment from nearby bare ground.	Federal Way
46		0014A RM 0.50	Geology	R,S	Stream flows through cleared area. Channel has been ditched. Unprotected	Federal Way

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					fill sideslopes approx. 10 feet high at 45 degrees. Erosion occurs from sideslopes into stream channels.	
46.1		0014A RM 0.57	Hydrology Geology Habitat	DI 87-0887	Clearing activity pushed trees into stream channel and denuded stream bank. Channel and streambank not stabilized in vicinity of S. 348th St. & 11th Ave. S.	Federal Way
47		0014A RM 0.58	Geology	R,S	Evidence of abundant gravel discharge. Gravel deposition in small wetland south of 348th St. Two small gabion check dams upstream from 348th St. are completely filled with sediment and are failing. Evidence of high flows.	Federal Way
48	No entry					
48.1		0014A RM 0.57-0.68	Habitat Hydrology Water Quality Land Use	S	In 1989 reach appears to have been channeled during road construction and plat development north of 348th St. The corridor is less less than 25 feet wide on both banks in the lower segment, and the soil along the right bank appears to be fill. Riparian vegetation is absent along the northern segment, which has also been intensively armored with riprap and log check dams below the outfall of a culvert at RM 0.68. A deposit of oils and greases from parking lots in the vicinity of Sea Tac Mall is visible below this outfall. Flow volumes are extremely erratic and are largely runoff from impervious surfaces to the north.	Federal Way
49		0014A RM 0.60-0.73	Geology Habitat Hydrology Water Quality Land Use	R,S	Heavy bank and channel erosion in 1985. Downcutting on order of 3 to 5 feet, with local incision at culvert outfall of 12 feet. Undercutting and failure of banks. Possible destabilization of adjacent fill 20 feet above stream. Total depth of channel is approx. seven feet. Cut shows four feet of fill over three feet native gravel. Approximate inset channel dimensions 2.0 m X 0.20 m.	Federal Way
50	No entry					



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51	No entry					
51.1		0014A RM 1.16	Water Quality	M	Hydrocarbon contamination has infiltrated stream sediments. At confluence of tribs. 0014A/0014C.	Federal Way
51.2		0014A RM 1.25 (QWKC)	Water Quality	S	Relatively low concentrations of TSS obtained at this site during storm events. Wetlands upstream of this location near Kitts Corner.	Federal Way
51.3		0014A RM 1.30-1.43	Geology Habitat Land Use	S,R	Extreme channel incision due to sudden drainage of Hylebos Wetland #10. Encroachment into riparian corridor due to filling of uninventoried wetland on SR 99.	Federal Way
52.		0014A RM 1.30	Geology	R,S	Gravel discharge from culvert under 336th St. This is outfall of a long underground storm system under a commercial development. Recent downstream incision locally 3 feet deep.	Federal Way
52.1		0014A RM 1.39 (QWH13)	Water Quality	S	Relatively high concentrations of Cu and Zn, and fecal densities during storm events. Potential sources include roadway runoff and automobiles. Potential effects include reduced spawning success, toxicity to freshwater aquatic species, and reduced recreational activities.	Federal Way
53		0014A RM 1.65	Habitat	R	Ditched stream, steep sideslopes with little or no vegetation. Severe bank erosion occurring. Gray, sudsy, foul water (pollution) enters this channel through pipe from SR 99.	Federal Way
53.1		0014A RM 2.30	Hydrology	C	Intersection at S.W. 320th St. and SR 99 flooded during the 1/9/90 storm.	Federal Way
53.2	WH11	<u>Off Channel</u>	Hydrology Geology	DI 86-1094	Culvert in vicinity of 335th St. and 13th Pl. S. silted up and caused Kindercare to flood. Silt also in drainage ditch to creek. Kindercare filed a claim against King County.	Federal Way

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53.3	WH11	<u>Off Channel</u>	Hydrology	C	Flooding at intersection of SR 99 and S. 324th St. during 1986 storm.	Federal Way
53.4	WH11	<u>Off Channel</u>	Hydrology	C	Flooding at SR 99 and S. 324th St. during the 1/9/90 storm.	Federal Way
53.5	WH12	<u>Off Channel</u>	Hydrology	DI 87-0746	Flooding at 10th Ave. S. & 320th St. during 86 storm. Claim File F83819.	Federal Way
54		0014B RM 0.28-0.30	Habitat	R	Sand in bedload, probably from construction of new road system in the West Campus area.	Federal Way
55		0014B RM 0.30	Geology	R,S	Stream flows through wetland area. Minor low bank erosion noted, probably natural. Channel dimensions 1.5 m X 0.30 m.	Federal Way
55.1		0014B RM 0.30-0.50	Hydrology Water Quality Habitat Land Use	S	High flood flows from Panther Lake overtopped intersection of 1st Ave. South and driveway entrance of Emerald Forest Apts. during 1/9/90 storm. 1st Ave. also flooded 12/5/90. Stormwater surcharged through sewer manhole on 12/5/89, which was paved over thereafter. Odor of raw sewage and erosion of road shoulders and pavement undermined during both storms. Adjacent portion of Hylebos Wetland #18 is threatened by sedimentation and increased frequency of inundation by stormwater. Widening of 1st Avenue South and construction of FWMSD pump station were accompanied by channelization and extreme encroachment into riparian corridor and into Hylebos Wetland #18. Stream appears to have been routed through road fill a few feet from the sidewalk on the west side of the road. Extreme bank instability due to excessive and highly erosive peak flows and total lack of overhanging vegetation, especially on the left bank.	Federal Way
55.2		0014B RM 0.37-1.00	Hydrology Water Quality	C,S	Severe flooding on 1st Ave. S. and S.W. 336th St. from Panther Lake during	Federal Way

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			Land Use		the 1/9/90 storm exceeded the design standards of the Panther Lake outlet. The resulting overland flow severely eroded a construction site and downstream forested area. Infiltration ability of Panther Lake has been drastically reduced.	
55.3		0014B RM 0.40-0.57	Geology Habitat Land Use	S	Channel ditched and rerouted across forest floor; heavily impacted from adjacent and upstream construction. One bank of the riparian corridor is somewhat buffered by relatively wide alder grove, one bank is grassed. High flows from Panther Lake during the 1/9/90 storm eroded channel and undermined sidewalk on 1st Ave. S.	Federal Way
56		0014B RM 0.57	Hydrology Geology	R	There is new regional detention facility constructed with recent improvements to S.W. 336th St. This appears well constructed, but property owner immediately downstream has complained of increased flows and local flooding. No flow in existing channel to facility.	Federal Way
56.1		0014B RM 0.57-0.67	Hydrology	S	Two culverts (30" + 36" cmps) drain Panther Lake outlet under S. 348th St. During the 1/9/90 storm, flooded S.W. 336th St. along west side of tributary. Peak flows are somewhat attenuated by the instream R/D pond within this reach.	Federal Way
57		0014B Lake	Hydrology	R	Panther Lake was performing very well as a regional R/D facility in 1985. The lake channel outlet was undefined, indicating good infiltration.	Federal Way
57.1		0014B Lake	Habitat Water Quality Hydrology Land Use	S	Panther Lake, a formally hydrologically isolated depressional wetland, was extensively altered in the mid-1980s to serve as an R/D facility for runoff from surrounding residential and commercial developments. Wetlands have been greatly reduced on all sides by past filling and removal of vegetation, resulting loss of habitat,	Federal Way

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					flood storage, and biofiltration. Severe flooding currently occurs at the outlet because of the addition of 583 acres of drainage area that used to infiltrate within a large (now filled) wetland west of the lake typical flood debris, increased impervious surface in the subcatchments that drain to the lake, and loss of infiltration capacity in the bottom of the lake from development-related sedimentation. Groundwater recharge has declined sharply within the last 3-4 years due to siltation of the lakebed. Water quality is chronically impaired by turbidity, oils, and greases from upland construction sites and impervious surfaces. Siltation from the lake is visible downstream at least as far as RM 1.04 on 0014, even under summer low flow conditions.	
57.2		<u>00014B Lake</u>	Hydrology	S	Recent construction directs runoff to new channel that enters the west side of Panther Lake behind King County Aquatic Facility. Runoff is carrying large amounts of silts to the lake.	Federal Way
57.3 (formerly 60)		<u>0014B RM 1.35</u>	Geology	R	Artificial (excavated) channel between this point (a power line crossing) and 1st Ave. S. Channel is cut in till and flow seems stable.	Federal Way
57.4 (formerly 61)		<u>0014B RM 1.40</u>	Habitat	R	Stream is ditched and flows to Panther Lake.	Federal Way
58		<u>0014B RM 1.60-1.70</u>	Hydrology	R	Conveyance system upstream well maintained, with several landscaped ponds act as onsite detention and habitat for domestic waterfowl.	Federal Way
59		<u>0014B RM 1.60</u>	Habitat	R	Natural channel exists just north of new R/D facility.	Federal Way
59.1	WH7	<u>Off Channel</u>	Geology Habitat Hydrology	DI 87-0727	Fill violation above 18-inch culvert and unauthorized instream work on tributary to Hylebos Wetland 18 at site on S. 356th St., E. of 1st Ave.S.	Federal Way

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59.2	WH13	<u>Off Channel</u>	Hydrology	C	Localized flooding in the vicinity of 4th Ave S.W. and 5th Pl. during the 1/9/90 storm.	Federal Way
59.3	WH14	<u>Off Channel</u>	Hydrology	C	Localized flooding in vicinity of S.W. 334th St. and 10th Ave. S.W. during the 1/9/90 storm.	Federal Way
59.4	WH14,L7	<u>Off Channel</u>	Hydrology	DI 86-1161 88-0001 88-0008 88-0268 88-0392 89-0485 87-0172	Flooding in vicinity of 10th - 16th Ave. S.W. & S.W. 321st - 330th Pl. Infiltration system filled in and park flooding. SWM DI has completed an engineering study of area.	Federal Way
60	See 57.6					
61	See 57.5					
62		0014C RM 0.00-0.30	Hydrology	R	Severe channel erosion has occurred on this reach from its start to the point where it emerges from a 36-inch pipe from Pacific Hwy. S. drainage system.	Federal Way
63		0014C RM 0.00-0.17	Geology	R,S	From RM 0.00 to 0.30, this stream was diverted from old channel down gravel road at same time Trib. 0014A, incised up to five feet into native ground. Lots of sediment being dumped onto 0014A. Headscarp of 7' knickpoint at RM 0.15 retreating at rates of a few feet per year.	Federal Way
64	No entry					
64.1	WH8	0014C RM 0.15	Hydrology	DI 90-0037	8 inches of water flooded SR 99 at S. 338th St.	Federal Way
64.2		0014C RM 0.15-0.34	Hydrology	S	S. 336th St. and SR 99 overtopped during 1/9/90 storm; one house near S. 336th St. had flooding. This is site of S. 336th St. CIP.	Federal Way
65		0014C RM 0.30	Geology	R	Evidence of recent overbank flows, but no serious erosion observed.	Federal Way

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65.1		0014C RM 0.34 (QWH11)	Water Quality	S	Relatively high concentrations of Zn and fecal densities during storm events. Potential sources include: roadway runoff, automobiles, sewer line leaks, wildlife, and pet wastes. Potential effects include: reduced spawning success, toxicity to freshwater aquatic species, and reduced recreational activities.	Federal Way
66		0014C RM 0.30-0.80	Habitat	R	Debris and probably pollutants from impervious surfaces. Small wetland at RM .80.	Federal Way
67	No entry					
68		0014C RM 0.30-0.86	Hydrology Geology	R,S	Erosion of a foot or more appears to be recent and may be related to WSDOT improvements to SR 99 storm system. Upper reach has some localized minor flooding caused by backwaters from culvert road crossings.	Federal Way
69		0014C RM 0.60	Geology	R	Stream excavated under 20th Ave., upstream from culvert. Minor bank erosion on excavated slopes. Residence located close to top of sideslopes.	Federal Way
70		0014C RM 0.70	Geology	R	Evidence of minor erosion of channel banks and floodplain.	Federal Way
71		0014C RM 0.82	Geology	R	Evidence of minor erosion of channel banks and floodplain. Till exposed in channel bottom.	Federal Way
71.1	WH10	<u>Off Channel</u>	Hydrology	C	Flooding 3' deep across S. 320th St. between 20th and 23rd Ave. S. Water covered the sidewalk throughout the 1/9/90 storm. Ponds at Sea Tac Mall nearly empty during this period.	Federal Way
71.2		0015 RM 0.0-0.47	Habitat Geology Land Use	S	Encroachment into riparian corridor by FWSWD access road. Downcutting 4 to 5 feet near mouth; substrate is unsuitably large (cobble/rubble) for salmonid spawning habitat and has filled in	King County

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					rearing habitat (pools). LOD is suspended 1 to 5 feet above streambed.	
72		0015 RM 0.10	Habitat Geology	R,S	Habitat in fair condition with large infinite slope failure at this river mile. Recent widening and incision suggested by bare bankcuts and notched channel. Incision up to 6 feet in small southern tributary to 0015.	King County
72.1		0015 RM 0.10-0.50	Habitat Geology Hydrology	S	FWSWD access road has been constructed on a berm along the right bank within a few feet of the stream. Stream is incising into the road bed in places. Excessive peak flows have caused severe downcutting (maximum depths = 6 to 7 feet; average depths = 1 to 3 feet), deposition of coarse sediment (cobble), cementing of gravels, filling in of pools, and scouring down to glacial till. Numerous small woody debris jams and tires are also present. In spite of the above problems, the stream still has good canopy and moderately good bank vegetation.	King County
73		0015 RM 0.20-0.95	Hydrology Geology	R,S	Accelerated channel erosion due to development above. Riprapped banks appear locally effective in stabilizing local bank failures, but channel and sidebank cut 2-3 feet high. Debris in streams facilitates; local deflections of stream are undercutting sidebanks. Channel dimensions 2.5 m X 0.25 m.	Federal Way
73.1		0015 RM 0.50	Habitat Hydrology	S	Stream and adjacent wetland partially impounded by 28th Ave. S. road fill. West of 28th Ave. S., part of the wetland has been filled for construction of the FWSWD access road along 0015.	Federal Way
74	No entry					

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
74.1	H2	<u>Off Channel</u>	Hydrology Habitat Geology Water Quality	DI 88-0094	Drainage channel flowing south to a wetland at S. 368th St.. S. and 28th Ave. S. is seriously degraded from horses having full access to creek. Water flowing slowly through 2-12 inch concrete pipes along north side of S. 368th St. in the vicinity of 28th - 32nd Ave. S. and it appears there are capacity problems downstream. R/D pond and its new pipes probably not associated with problems, but roadside ditches on 368th St. partially full of debris and silt. Residence flooded during 86 storm.	Federal Way
74.2	H2	<u>Off Channel</u>	Habitat Water Quality Land Use	DI 88-0240	Scummy, odorous water in drainage channel flowing south from S. 374th Street, west of 34th Ave. S.	King County
75		0016 RM 0.00-0.38	Geology Habitat Land Use	R,S	Ten foot high bank cut exposes till over gravelly advance outwash at RM 0.02 Floodplain is 0-10 feet wide above RM .02-.38. Channel dimensions 3.0 m X 0.35 m. Deposition of coarse sediment is filling in pools and patches of streambed are scouring down to glacial till. Many tires in stream, along with trash from SR 161. Debris jam and five foot high impassable nick point at RM 0.30. Intermittent flows limit fish use much of the year.	King County
76		0016 RM 0.10-0.20	Habitat	R	In general, gravel and stream habitat in 1985 was good.	King County
77		0016 RM 0.20	Geology	S	Heavy recent deposition of sand in stream gravels. Numerous recent small-scale bank cuts and channel incision.	King County
77.1		0016 RM 0.30-0.50	Habitat	S	Excessive peak flows have caused severe downcutting, channel widening, deposition of coarse sediment, filling of pools, and patches of stream scouring to glacial till. Recent widening of SR 161 disturbed or eliminated riparian vegetation at upper end of channel. Intermittent flows limit fish use much of the year.	King County



HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
77.2		0016 RM 0.35	Geology	S	Bank cuts 1-2 feet; sewer pipe partly exposed crossing stream bed.	King County
77.3		0016 RM 0.50	Geology	S	Actively expanding 6'-high knick-point. 3' bank cuts typical downstream.	King County
77.4		0016 RM 0.55	Geology	S	Overly steep, unprotected fill slope at road crossing contributing much sediment to stream. Channel dimension: 1.5 m X 0.25 m.	King County King County
78		0016 RM 0.63	Geology	R	Large plunge pool and 10-foot undercut bank erosion present in 1985 at downstream end of culvert crossing SR 161 is no longer there. Embankment has been regraded, the culvert extended, and a manhole was installed as part of Regency Woods development.	King County
78.1		0016 Outflow from Regency Woods R/D Pond (QWR1)	Water Quality	S	Relatively high concentrations of TSS and Cu during storm events. Potential sources include: construction activities and roadway runoff associated with Regency Woods development. Potential effects could include: reduced spawning success (downstream) and toxicity to freshwater aquatic species.	King County
78.2		0016 Outflow from Regency Woods R/D Pond (QWR2)	Water Quality	S	Relatively high concentrations of TSS and Cu during storm events. Potential sources include: construction activities and roadway runoff associated with Regency Woods development. Potential effects could include: reduced spawning success downstream and toxicity to freshwater aquatic species.	King County
78.3		0016 RM 0.68 (QEH4)	Water Quality	S	Relatively high concentrations of NO <sub>3</sub> + NO <sub>2</sub> , Cu, and fecal densities during storm events. Potential sources include: fertilizers from	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					lawns and gardens, automobiles, Puyallup Kitts Corner retired sanitary landfill, failing on-site septic systems, sewerline leaks, and pet wastes. Potential effects include: eutrophication, toxicity to freshwater aquatic species, and reduced recreational activities.	
79		0016 RM 0.70	Habitat	R	Salmon blockage at culvert. Deeply incised bank from outfall of culvert in 1985. R/D pond not sized correctly on E. side of SR 161. Since 1985, the E. side of R/D was regraded to enlarge the channel and ponding area and culvert replaced. But culvert system is still a barrier to migration. Riser placed to carry flood overflows.	King County
79.1	H6	0016 RM 0.80	Hydrology	C	Localized flooding in vicinity of 25th Ave. S. and 367th Pl. during the 1/9/90 storm.	King County
79.2		0016 RM 0.82-0.95	Habitat Water Quality Hydrology Land Use	S	Release from Weyerhaeuser pond possibly caused high flow during 1986 storm. Significant erosion and sedimentation downstream of landfill. Stranded fish observed along streambank.	King County
79.3		0016 RM 0.82-0.92	Hydrology Land Use	S	Numerous driveway culverts and channel encroachments along 21st Place S. and S. 362nd Ct.	King County
80		0016 RM 0.83	Geology	R,S	Stream flows in open channel through housing development. Evidence of recent high flows. Sand infilling channel gravels.	King County
80.1		0016 RM 1.03	Habitat Hydrology Land Use	S	New in-stream R/D ponds for Evergreen Vale Apts. All LOD and native riparian vegetation has been replaced by mowed grass and landscaping. Trails cross the stream in two places and parallels the stream within 5 to 50 feet on both sides. A sprinkler system has been installed within 30 feet of the stream. Application of	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
81	No entry				fertilizers and pesticides within the riparian corridor is probable. R/D functioned properly during the 1/9/90 storm. R/D designed to handle the 100-year storm. Apt. Manager said he pumped stormwater downstream across S. 360th St. during 1/9/90 storm.	
82		0016 RM 0.95	Habitat	R,S	Stream is sand-choked. Small amount of debris. Potential R/D site. Existing downstream culvert at/near capacity during high flows.	King County
82.1		0016 RM 1.20	Hydrology	S	Trash rack mounted on culvert outfall. Bank incision 1'-2' in trapezoidal channel.	King County
82.2	H8	0016 RM 1.30	Hydrology Geology	S	Existing 36" pipe at north end of old King County landfill overtopped in 1/9/90 storm. Culvert outlet near Evergreen Vale Apts. eroded by overland flow.	King County
83		0016 RM 1.60	Habitat Land Use	R	Stream channelized around old King County landfill. Good vegetative cover over stream. Riverine wetland at this river mile. A new plat is encroaching on the S. end of this wetland. Possible illegal filling.	King County
83.1		0016 RM 1.60	Geology	S	Channel dimension 3.0 m X 0.40 m in forested wetland.	King County
83.2		0016 RM 1.92 (QEH5)	Water Quality	S	Relatively high concentrations of Cu during storm events. Potential sources include: automobiles, roadway runoff (SR 18), and parking lot runoff from Weyerhaeuser Pond.	King County
84		0016 RM 2.39	Habitat Hydrology	S	No problems. Stream currently in good condition. Flow release from Weyerhaeuser Pond is controlled by adjustable weir within the Headquarters. Weir adjusted by maintenance man.	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
84.1		0016 Pond	Habitat Water Quality Land Use	S	Stream has been impounded to form Weyerhauser reflection pond that supports yellow perch, and possibly other warmwater fish and rainbow trout. Littoral habitat is limited by ongoing removal of emergent revegetation and lack of bank and canopy vegetation. Runoff from I-5 and nearby roads enters pond through a system of ditches which undergo severe erosion during peak flows. Excessive waterflow use is promoted by daily feeding of hundreds of geese and ducks. Nutrients and avian feces enter the pond directly and in surface runoff from surrounding lawns and trails.	King County
85		0016 RM 2.10-2.60	Hydrology	R	No apparent drainage problems in 1985 due to R/D provided by North Lake and the Weyerhauser Pond and by current moderate levels of development.	King County
85.1		0016 RM 2.50-2.59	Habitat Geology	S	Canopy and bank vegetation provide wildlife habitat throughout most of this reach, except for a short segment just upstream from the Weyerhauser pond in which riparian vegetation is removed on an ongoing basis. Peak flows have caused moderate downcutting and scouring down to glacial till. Small (2 foot) knick point approximately 200 feet upstream from the pond.	King County
86		0016 RM 3.00	Habitat	R	No habitat observed in 1985.	King County
86.1		0016 Lake	Habitat Hydrology Geology	DI 88-0343	North Lake outlet control weir and concrete pipe extension broken, inability to control lake level and fish are escaping. Earthen berm detaining lake is eroding.	King County
86.2		0016 Lake	Habitat	S	North Lake is the largest lake in the Hylebos basin, and has the best littoral and lacustrine habi-	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					tat. It supports warmwater fish (yellow perch and largemouth bass) and rainbow trout; the latter are planted by WDW. The lake is largely surrounded by mature second growth forest, except for the east shoreline, which is bordered by single-family residences. A large forested parcel on the west side is on the King County Open Space Program acquisitions list.	
86.3	H10	<u>Off Channel</u>	Hydrology	C	Localized flooding on east side of Weyerhauser Pond and 30th Ave. S. during the 1/9/90 storm.	King County
86.4	H12	<u>Off Channel</u>	Hydrology Water Quality	DI 86-1176	Flooding at S. 330th St. and 38th Ave. S. is causing septic tanks to fail.	King County
86.5		0016A Undefined Ditch (QEBF) and (QEBF1)	Water Quality	S	Relatively high concentrations of NO <sub>3</sub> + NO <sub>2</sub> , TP, TSS, Cu, and fecal densities during storm events. Potential sources include: bird farm associated with Enchanted Village, sewer and stormwater pump stations (i.e., at Enchanted Village outdoor restroom and residence) mixing during large runoff events, and roadway runoff. Potential effects could include: eutrophication, nuisance growths of algae, toxicity to freshwater species, and reduced spawning success downstream.	King County
86.6		0016A Undefined Ditch (QEBF2)	Water Quality	S	Potential sources include: sewer and stormwater pump stations (at Enchanted Village associated with outdoor restroom and residence) mixing during storm events. Potential effects include: eutrophication, nuisance growths of algae, reduced spawning success, toxicity to freshwater species and limited recreational activities. A fish kill on 12/13/89 below this site in the	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					Regency Woods development site was observed by SWM Division staff.	
86.7		0016A RM 0.00-0.10	Habitat Land Use Hydrology Water Quality	S	Excessive peak flows have scoured the streambed down to glacial till. Upper end of reach flows through a diffuse channel within a palustrine, forested, seasonally inundated wetland mature black cottonwood, red alder, and willows. This wetland is subjected to excessive peak flows, and surface runoff and erosion of SR 161 road fill. On 11/14/89 the swale near the SR 161 culvert was relatively turbid, but water downstream in 0016A was clear. The wetland appears to perform carry out sediment trapping, biofiltration (nutrient uptake), flood storage, in addition to its wildlife habitat.	King County
87		0016A RM 0.10	Geology	R,S	Erosion is active at and above where channel crosses SR 161.	King County
87.1		0016A RM 0.19 (QEH2)	Water Quality	S	Relatively high concentrations of NO <sub>3</sub> + NO <sub>2</sub> , TP, and Cu during storm events. Potential sources include: fertilizers from lawns and gardens immediately upstream, automobiles, and I-5 runoff. Potential effects could include: eutrophication and nuisance growths of algae, and toxicity to freshwater aquatic species.	King County
88		0016A RM 0.20	Geology	R	Stream in open channel through housing development. No erosion.	King County
88.1		0016A RM 0.20-0.30	Hydrology	S	Housing development encroaching on riparian corridor. Streets and one house flooded during the 1/9/90 storm. One house on south side of S. 363rd Pl. had lower floor flooded @ 3' deep. Stormwater ovetopped detention pond wall adjacent to the stream.	King County

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
89		0016A RM 0.20-0.35	Habitat	R	Stream shows signs of high peak flows from large amount of impervious surfaces.	King County
90		0016A RM 0.35	Geology	R,S	Minor bank erosion is evidence of recent high flows. Several knickpoints 1 to 2 feet high. Gravel bed is cemented with fines. Channel dimension 2.0 m X 0.40 m.	King County
90.1		0016A RM 0.40	Hydrology	S	Culvert underneath access road is undersized; extreme backwatering on 1/9/90 jeopardized natural gas valve.	King County
90.2		0016A RM 0.40	Hydrology	S	Possible R/D site on north side of S. 360th St. extended, near I-5 and Milton Road.	King County
91		0016A RM 0.40-0.75	Hydrology Habitat Water Quality Land Use	R,S	Reach is conveying greater flows than anticipated in 1985 due to discovery of 48-inch culvert channeling flows from area five under I-5. Reach appears to be generating the most significant level of increased flows to this branch of Hylebos Creek. This segment consists of a shallow ditch excavated by DOT during construction of I-5, causing part of the flow that used to run into 0013 to now flow into 0016, and ultimately to 0006. ORV use of an access road at the lower end of this reach is a source of erosion into the stream. The streambed consists mainly of small river gravel, small crushed rock from I-5, and silt. The substrate is generally loose and unstable, although excessive peak flows have scoured down to glacial till in places. Both banks are extremely deficient in canopy and bank vegetation.	King County/ Federal Way
92		0016A RM 0.68 (QEH3)	Geology Water Quality	R,S	Channel runs along freeway, then passes under it at this point. Some scour and sidebank degradation to 3 feet high.	King County/ Federal Way

HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2/3</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					Relatively high concentrations of NO <sub>3</sub> + NO <sub>2</sub> , TP, and Cu during storm events. Potential sources include: fertilizers, automobiles, and street and highway (I-5) runoff. Potential effects could include: eutrophication, nuisance growths of algae, and toxicity to fresh-water aquatic species.	
92.1		0016A RM 0.70	Water Quality	S	Deposition of dredge spoils on left bank.	Federal Way
93		0016A RM 0.75	Habitat	R	Stream shows signs of high peak flows from large amount of impervious surfaces. Channel was moved from sub-catchment WH3 and new flows under I-5 to subcatchment H9.	Federal Way
93.1		0016A RM 0.80-0.12	Habitat Water Quality Land Use	S	DOT channelized stream into shallow ditch during I-5 construction. Moderate canopy and bank vegetation.	Federal Way
93.2		0016A RM 1.12	Hydrology Water Quality Land Use	S	Inadequate channel capacity coupled with local constriction at an inadequately sized culvert in the stream relocation channel behind Costco caused severe flooding on 1/9/90. The channel contains uniform-sized gravel; the riparian corridor was planted with inadequate amounts of vegetation and is especially deficient in conifers. Landowner wants to relocate the stream into a ditch DOT channelized stream into shallow ditch during I-5 construction. Moderate canopy and bank vegetation.	Federal Way
94		0016A RM 1.50	Hydrology	R	Flows from this area are tributary to to Recon. subcatchment area 8, not 9, as previously recorded. Flows are conveyed by ditch along west side of I-5 to 48-inch culvert that connected to trib. 0016A. This area is producing most significant increased flows to downstream system.	Federal Way
94.1		0016A	Geology	S	Channel dimension: 2.0 m X	Federal Way



HYLEBOS CREEK BASIN  
OBSERVED CONDITIONS

<u>Item</u> <sup>1</sup>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile</u> <sup>2/3</sup>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
		RM 1.70			0.25 m.	
95	0016A RM 1.80		Habitat	R	Ditched stream. Sudsy water from freeway drainage.	Federal Way
96	0016A RM 2.20		Geology	R,DB 782a-88	Downstream from crossing with 336th, west of freeway. Channel ditched at time of freeway construction. Modest erosion in channel.	Federal Way

**A P P E N D I X   B**

**LOWER PUGET SOUND BASIN  
OBSERVED CONDITIONS SUMMARY**

**LOWER PUGET SOUND BASIN  
OBSERVED CONDITIONS SUMMARY**

**DATA SOURCE INDEX**

- P 1985 and 1988 aerial photos observation**
- R Reconnaissance Program Observation**
- S Basin Planning Staff Observation**
- M Metro Observation Report**
- K King County Conservation District Observation**
- DI SWM Drainage Investigation Observation**
- C Citizen Observation**
- O Other Agency Observation**

**KEY TO WATER QUALITY CONDITIONS**

**\* = sampling location identifier**

**NO<sub>3</sub> + NO<sub>2</sub> = Nitrate + Nitrite - Nitrogen**

**TP = Total Phosphorus**

**Cu = Copper**

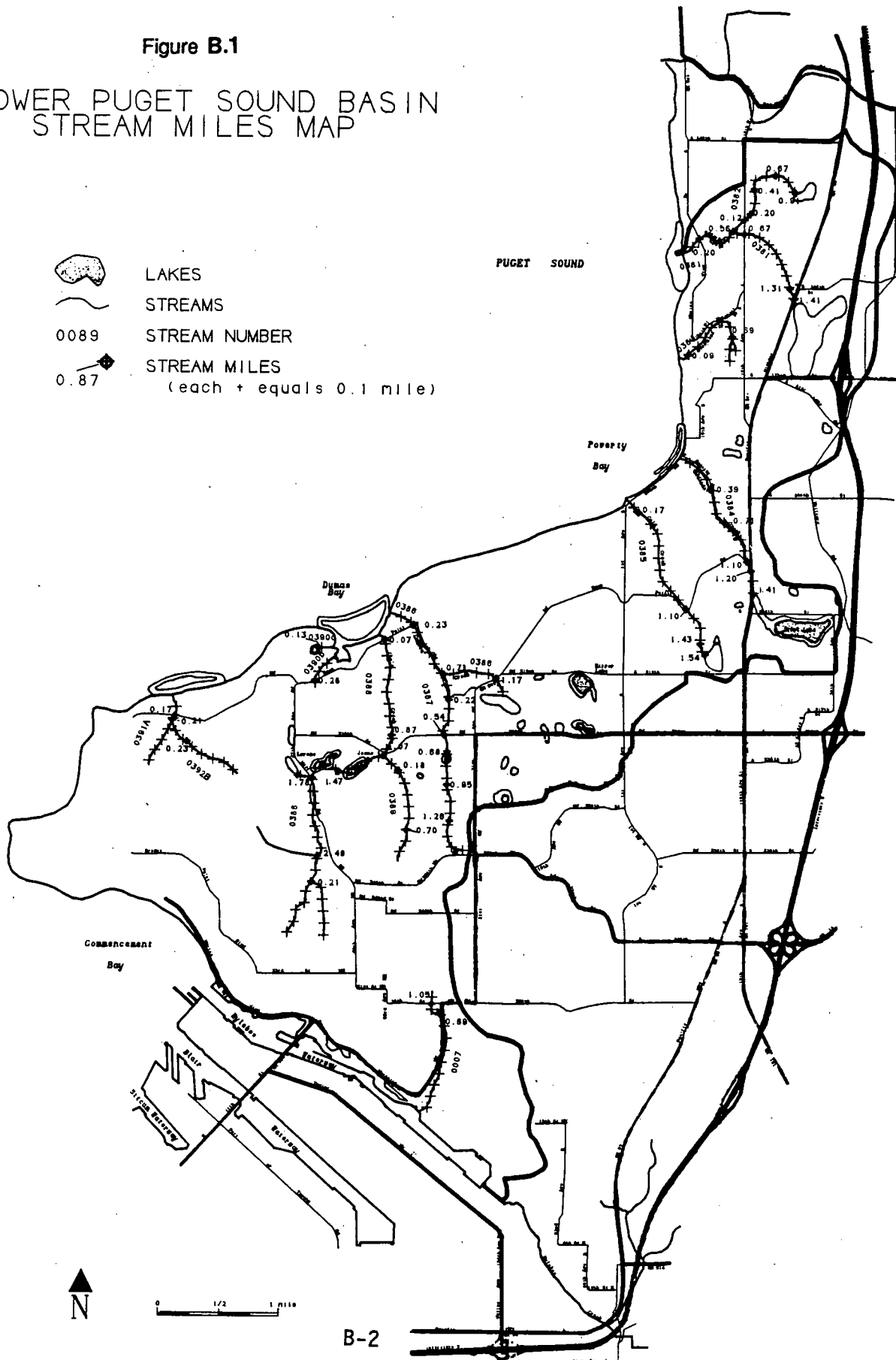
**Pb = Lead**

**Zn = Zinc**

**TSS = Total Suspended Solids**

**Fecal = Fecal Coliform Bacteria**

# LOWER PUGET SOUND BASIN STREAM MILES MAP



LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
1	Outside study area					
2-4	No entry					
5	Coastal		Geology	R	Mapped landslides. Steep headwall slopes and coastal bluffs. Surface erosion on steep slopes when soil is exposed.	Federal Way
6	Coastal		Geology	R	Landslide on coastal bluff has moved (probably since January 1986 storm).	Federal Way
6.1	NW of J1 Coastal		Geology Hydrology	DI 87-0362 86-0193	Potential for slide due to neighbor discharging water on top of steep bluff at 36th Ave. S.W. & SR 509.	Federal Way
6.2	S of W1 Coastal		Hydrology	DI 990-0035	Water coming from manhole on 8th Ave. S. near S. 273rd Crt. and one house, driveway, and pool flooded during 1/9/90 storm.	Federal Way
6.3	NW of R4 Coastal		Hydrology Geology	DI 89-0480 89-0710 90-0219	Road drainage causing house to sink. Three-foot sink hole was rerouted in the vicinity of 7th Ave. S.W. & S.W. 294th St. Resident concerned house may slide into ravine on S.W. 294th St. & 6th Ave. S.W. Water from 1/9/90 storm flooding driveway and maybe garage. Complainant felt County project was cause of flooding.	Federal Way
6.4	S of S1 Coastal		Hydrology	DI 89-0739	6-8" of water filled crawl space under house at 9th Ave. S. and S. 261st Pl. during 12/89 storm.	King County
6.5	N of R1 Coastal		Hydrology	DI 88-0752 88-0032	Logging operation left trees in drainage channel blocking an 18" culvert in vicinity of S. 281st & 9th Ave. S. Drainage and mud flowing to property in vicinity of 282nd St. & 8th Ave. S.	King County

<sup>1</sup> Item Numbers - whole item numbers refer to entries from the 1986-1987 King County Basin Reconnaissance Program. Entries designated with a decimal number supplement and update the Reconnaissance Program.

<sup>2</sup> See Figure B.1 for river mile map.

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
6.6	<u>N of R1 Coastal</u>		Hydrology Geology	DI 88-0065 88-0012	Property on steep slope was cleared promoting a small slide in the vicinity of S. 272nd St. - S. 275th & 10th Ave. S.	King County
6.7	<u>NW of J2 Coastal</u>		Geology	DI 88-0559	Property owner cut into road right-of-way and removed two trees to build driveway down an almost 50% slope at SW 311th Place & 52nd Ave. SW. Undue disturbance could create a slide hazard.	Federal Way
6.8	<u>NW of J2 Coastal</u>		Hydrology Geology	DI 88-0779	Drainage from a culvert under SR-509 is sheet flowing onto a County road, 53rd Ave. SW via swaleflow. Roadside 12" pipe receiving water is plugged and its outlet is unknown. Overflow from pipe appears to flow to top of bluff. Possible erosion from runoff.	Federal Way
6.9	<u>W of R4 Coastal</u>		Hydrology	DI 87-1045	Property owner built railroad tie bulkhead that blocked an 8" CMP outlet at the west end of SW 292nd St. on the S. side, approximately 150' west of 3rd Ave. S.W.	Federal Way
6.10	<u>W of R4 Coastal</u>		Geology	DI 87-0222	Illegal fill moved onto site. Erosion running onto neighbor at 1st Ave. and S.W. 293rd St.	Federal Way
6.11	<u>N of R4 Coastal</u>		Geology Hydrology	DI 90-0335	Large slough occurred near 7th S. and S. 288th Ln. during 1/9/90 storm damaging property below. Area has history of slides.	Federal Way/King County
6.12	<u>NW of R1 Coastal</u>		Hydrology	DI 87-1121	Private concrete structure at S. 274th Pl. and 8th Ave. S. overflowed partially due to debris clogging pipe and possibly excess flows. Overflow flooded downstream pumphouse and pool.	King County
6.13	<u>NW of R1 Coastal</u>		Geology	DI 87-0838	Site cleared above steep slope with no erosional/sedimentation controls. Runoff coming to one side of site. Earthwork may weaken bluff at S. 275th St. & 8th Ave. S.	King County
6.14	<u>N of R1 Coastal</u>		Hydrology	DI 86-0553	Flooding at several residences on 13th Ave. S. & S. 280th St. since new	King County

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

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					developments built in hillside above and wetland was filled. Drainage channel relocated across complainant's property.	
6.15	NW of R4 Coastal		Geology Hydrology	C,DI 87-0269	Drainage from 2nd Adelaide Beach Estates flowing onto a ravine on 20th Pl. S.W. N. of S.W. 304th St. House with bulkhead built over channel and culvert through bulkhead backing-up water to house.	Federal Way
6.16	NE of M1 Coastal		Hydrology	DI 86-0610	Site at SE ¼ of 1st Ave. S. & S. 308th St., receiving flows from several directions. Fill from Fed. Way Medical Center encroaching on drainage surface flow. Also, culvert under 1st Ave. blocked.	Federal Way
6.17	NW of J2 Coastal		Hydrology Geology	DI 90-0497	Water drains off S.W. 311th Pl. and 53rd Ave. S.W. Eroding beach bank.	Federal Way
6.18	NW of J2 Coastal		Hydrology	DI 86-0824 90-0162	Large fill placed near outlet of 18" CP draining under SR 509 at 50th Ave. S.W. Other fill blocked CP outlet site east of King County property. Palasades Park flooding from stormwater diverted by fill.	Federal Way
6.19	Coastal	0390A	Hydrology Geology	DI 87-0948	Site cleared, potential for erosion into creek on 44th Ave. S.W. and SR 509. Also, state culvert under SR 509 needed cleaning.	Federal Way
7-19	Outside of Study Area					
20		0381 RM 0.15	Habitat	R,S	Good spawning gravels throughout, but diversity is lacking. Channel dimensions are 6.0 m X 0.30 m.	King County
20.1		0381 RM 0.05 (QM1)	Water Quality	M	NO <sub>3</sub> + NO <sub>2</sub> , TSS, and turbidity concentrations (monitored during baseflow conditions) were generally good (low) and "better" in comparison to the 44 routine stream and river sites (median values) during the same period in Metro's Freshwater Assessment	King County

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					Program. No sample for DO and temperature exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period. Fecal coliform densities exceeded DOE criteria 25% (3 times) during baseflow conditions.	
20.2		0381 RM 0.15 (QM1)	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, Pb, Zn, and fecal densities during storm events. Potential sources include: fertilizers, soil erosion, automobiles, failing on-site septic systems, and sewer line leaks. Potential effects of these pollutants include: eutrophication and nuisance growths of algae, toxicity to both freshwater and marine aquatic species, reduced spawning success of resident trout, and limited recreational activities (e.g., swimming, diving, and shellfish harvesting).	King County
21		0381 RM 0.25	Habitat	R	Excellent spawning riffles. Little diversity or overhanging vegetation.	King County
22		0381 RM 0.35	Hydrology	R	Culvert discharging across S. 251st St. and causing bank erosion in Saltwater State Park	King County
23		0381 RM 0.40	Habitat	R,S	Recently installed log weirs failing at low flows. Downstream weir is 2' barrier to fish. Heavy gully deposition in step-weir pools. Channel dimensions are 4.0 m X 0.30 m.	King County
24		0381 RM 0.60-0.80	Geology	R,S	Hillslope erosion under 16th Ave. S. bridges, below trails and campgrounds.	King County
24.1		0381 RM 0.60	Geology	S	Ravine incision up to 20' deep into right bank hillside from upland drainage.	King County
24.2		0381 RM 0.80	Geology	S	Large, old right-bank hillside failure. Smaller bank failure from lateral stream migration common downstream to bridge.	King County



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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
25		0381 RM 1.00	Geology	R,S	Large slump blocks on north side of valley. Undercut sides on south side. Moderate channel erosion; irregular channel dimensions 3.0 m X 0.20 m.	King County
25.1		0381 RM 1.04	Geology	DI 86-01E9	Seven acre site on McSorley Creek ravine cleared between S. 257th St. & S. 260th St. behind 20th Ave. S.	King County
26		0381 RM 1.20	Habitat	R	Excellent habitat. Riffles free of silt. Pools contain many resident and anadromous fry. Approximate channel dimensions 1.50 m X 0.20 m.	King County
27		0381 RM 1.20-1.45	Geology	R	Downcutting, bank and hillslope erosion in loose sandy-gravelly soils. Channel dimensions 3.0 m X 0.30 m.	King County
27.1		0381 RM 1.37	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, and fecal densities (QM2) during storm events. Potential sources include: fertilizers, nutrient release from sediment/ aquatic plants in wetlands, roadway runoff from SR 99 and a park-and-ride lot, apartment parking lots, automobiles, failing on-site septic systems, sewer line leaks, and wildlife. Potential effects of these pollutants include: eutrophication and nuisance growths of algae, soil erosion, toxicity to both freshwater aquatic species, and limited recreational activities.	King County
28		0381 RM 1.51	Hydrology	R	Collection point occurs at sensitive area (state park) and receives flow from largest drainage area.	King County
29		0381 RM 2.0	Geology	R	Downcutting and bank erosion.	King County
29.1	S9	0381 Headwaters	Hydrology	DI 87-0358 86-0158	R/D pond on S. Star Lk. Road near 24th Pl. S. is overtopping during storms because the catch basin is getting blocked with debris. The emergency spillway is not at the lowest point causing water to flood to adjacent residence.	Federal Way

LOWER PUGET SOUND BASINS  
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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
29.2	S9	0381 Headwaters	Hydrology	DI 87-0373	The culvert under a private road at 26th Ave. S. & Star Lk. Road, drains a wetland. It is blocked and floods the road, but it appears the road would flood if culvert were open.	Federal Way
29.3	S9	0381 Headwaters	Hydrology	DI 88-0106	A 36" metal pipe under S. 272nd St. has 22" of standing water in it. Silt from the drainage channel on S. Star Lk. Road has built up in an 18" concrete culvert. This culvert had 9" of standing water in it. Redondo Beach condominium construction filled an outlet ditch. SWM DI study on 272nd/Star Lake Road to be completed in 1990.	King County
29.4	S8	<u>Off Channel</u>	Hydrology	DI 87-0734	Natural channel was filled, sink holes formed in wet weather on S. 256th St. at 29th Ave. S.	King County
29.5	S8	<u>Off Channel</u>	Hydrology	DI 89-0060	Water flowing along 31st Ave. S. at S. 253rd St. Year around flooding and freezing on the street.	King County
29.6	S9	<u>Off Channel</u>	Hydrology	DI 89-0794	R/D pond at end of 20th Ave. S. & S. 279th Pl. near Redondo Crest Apts. is full. It appears there's too much drainage for the pond at the south end of 20th Ave. S. This pond is one of KC's olds/offs.	King County
30		0382 RM 0.10	Habitat	R,S	Heavy silt deposition in pools and riffles; debris encouraging channel migration and some bank failure. Channel dimensions 3.0 m X 0.30 m.	King County
30.1		0382 RM 0.12 (#11)	Water Quality	0	Relatively low dissolved oxygen concentrations observed during the summer months. Relatively high concentrations of TP, NO <sub>3</sub> , Cu, Zn, and fecal densities during spring, summer, or winter periods from 1986-1989. Potential sources include: fertilizers, roadway runoff, automobiles, failing on-site septic systems, sewer line leaks, wildlife and pet wastes. Potential impacts could include:	King County

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					eutrophication and nuisance growths of algae, toxicity to freshwater and marine aquatic spe- cies, and reduced recreational activities (e.g., swimming, diving, and shellfish harvesting).	
31		0382 RM 0.45	Hydrology Water Quality	R	Water quality adversely affected by grease and oils due to poor construc- tion of R/D facility (i.e., invert of control structure above emergency spillway).	Des Moines
31.2		0383 RM 0.00	Geology	S	Active fan-building at beach; culvert outlet is 1/2-full.	King County
32		0383 RM 0.15	Geology	R	Loss of part of road in 1/86 storm. Road drainage directed over hill but outfall is buried.	King County
32.1		0383 RM 9.20	Hydrology	DI 86-0159	Ditch to tributary overflowing into yards on 14th Ave. S. and S. 270th St.	King County
32.2	W2	<u>Off Channel</u>	Hydrology	DI 90-0040 90-0253 90-0254 90-0365	One foot of standing water in basement and crawl spaces of home in vicinity of 18th - 20th Ave. S. at S. 263rd Pl. and 264th Pl. during 1/9/90 storm.	King County
32.3		0383 RM 0.17	Geology	S	Local 3'-5' bank scours; much sand in bed. Owner of streamside house reports no problems 1986-1988	King County
32.4		0383 RM 0.52	Geology	S	Relatively stable banks; Channel dimensions 1.0 m X 0.20 m.	King County
32.5	<u>S of 0383 Coastal</u>		Geology	S	Old, apparently inactive landslide bowl, between Marine View Dr. S. and 13th Ave. S. at about S. 277th St.	King County
32.6	<u>S of 0383 Coastal</u>		Geology	R,S	Mapped landslide; headscarp still steep and bare. Development on downslope slide debris.	King County
33		0384 RM 0.00-0.60	Hydrology	R,S	Moderate channel erosion in trib. 0384 from RM 0.00-0.60. Culvert flooding at RM 0.11 with associated gravel deposi- tion. Channel dimensions 2.0 m X 0.40 m.	King County/ Federal Way

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
33.1	W of R1	0384 RM 0.00	Hydrology Geology	DI 88-0080	Erosion at 4' cnp inlet in vicinity of Redondo Way & 4th Pl. S. inlet draining to a 3' system. Three-foot arched pipe inlet W. of Redondo Way does not have an inlet grate. Large rocks and debris could enter inlet. A 6' by 6' slump has formed possibly from underground drainage pipe. The County has asked homeowners to buy slump area.	King County
33.2		0384 RM 0.01 (QC1)	Water Quality	M	NO <sub>3</sub> + NO <sub>2</sub> and turbidity concentrations (monitored during baseflow conditions) were generally good (low) and "better" in comparison to the 44 routine stream and river sites (median values) during the same period in Metro's Freshwater Assessment Program. No sample for DO, temperature, and pH exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period.	King County
33.3		0384 RM 0.01 (QC1)	Water Quality	S	Relatively high concentrations of TP, TSS, Cu, Pb, Zn, and fecal densities during storm events. Potential sources include: fertilizers, soil erosion, automobiles, failing on-site septic systems, and sewer line leaks. Potential effects of these pollutants include: eutrophication and nuisance growths of algae, toxicity to both freshwater and marine aquatic species, reduced spawning success of resident trout, and limited recreational activities (e.g., shellfish harvesting and swimming).	King County
33.4	R1	<u>Off Channel</u>	Hydrology Geology	DI 89-0327	Erosion below old 24" culvert under SR 99 at S. 284th St.	Federal Way
33.5	R1	<u>Off Channel</u>	Hydrology Geology	DI 88-0165	Steep roadside bank is eroding bringing rock and debris onto sidewalk and private drain tiles are outletting to sidewalk on 15th Pl. S. and S. 290th Pl.	Federal Way

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
33.6	R1	<u>Off Channel</u>	Geology	DI 86-1142	Two caves on roadside SW of Redondo Way S. between SR 509 and Redondo Way 40+ feet across.	Federal Way
33.7	R1	<u>Off Channel</u>	Geology	DI 87-1015	Slope failure along pipeline at approx. S. 288th St. and SR 509 may be caused by excessive rain and drainage discharges on top of slope. Major mud flow came down on County road.	Federal Way
34		0384 RM 0.40-0.80	Geology	R,D DI 86-1136	Downcutting and bank erosion exist in previously unchanneled valley (upper) and along Redondo Way S. (lower). Incipient hillside failure along right bank at RM 0.40; January 1986 failure of hillside above left bank blocked road. Further hillside failure during 1/9/90 storm. Past stabilization efforts unsuccessful.	Federal Way
34.1		0384 RM 0.89-0.95	Hydrology	DI 86-1061 86-0165 86-0190 86-1144	Fill site blocking the natural outlet of an 18" cross tile causing local flooding on 18th Ave S. between S. 296th St. & S. 293rd St.	Federal Way
34.2	R2	<u>Off Channel</u>	Hydrology	DI 90-0084	Two inches of standing water in basement on 18th Ave. S. at S. 293rd St.	Federal Way
34.3		0384 Lake	Hydrology Water Quality	DI 86-1267	Steel Lake outlet culvert filling with sediment and oils at 21st Ave. S. & S. 304th Street.	Federal Way
34.4		0384 RM 1.10 (QC2)	Water Quality	S	Relatively high concentrations of Cu, Zn, and fecal densities during storm events. Potential sources include road runoff associated with SR 99, a gasoline service station immediately upstream, failing on-site septic systems, and sewerline leaks. Potential effects of these pollutants include: toxicity to freshwater and marine species and limited recreational activities (e.g., swimming and shellfish harvesting).	Federal Way
34.5		0384 RM 1.60	Water Quality	S	Relatively high concentrations of Cu and fecal densities during	Federal Way

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u> (QC3)	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					storm events. Potential sources include: roadway runoff, an apartment complex parking lot, failing on-site septic systems, sewerline leaks, and wildlife. Potential effects of these pollutants include: toxicity to freshwater and marine species and limited recreational activities.	
35		0385 RM 0.05	Hydrology	R	Existing drainage not adequate to handle projected growth.	Federal Way
35.1	NW of R4 Coastal		Geology	DI 86-1282 86-0227	Large old mapped landslide with typical slide topography has been logged potentially accelerating slide movement at 10th Ave. S.W. & S.W. 294th St. Shoreline erosion at toe of slope.	Federal Way
36		0385 RM .05-0.15	Geology	R,S	Recent active slope failures, especially southwest of the creek.	Federal Way
36.1	R4	<u>Off Channel</u>	Hydrology	DI 90-0042	Water in basement crawlspace on S. 301st Pl. near 8th Ave. S.	Federal Way
36.2		0385 RM 0.17	Geology	S,DI 87-250 88-0474	Landslide above Del Ray Mobile Home Park on S. 290th St. & 1st Ave. S.	Federal Way
37		0385 RM 0.18	Habitat	R	6' by 200' concrete pipe (creates velocity barrier for upstream migrating salmonids).	Federal Way
38		0385 RM 0.32	Habitat Geology	R,S	Debris jam barrier; active channel erosion.	Federal Way
39		0385 RM 0.70-0.80	Geology	R,S	Channel downcutting and bank erosion, up to 10' deep.	Federal Way
39.1		0385 RM 1.00	Geology	S	Slot erosion, up to 6' deep. Channel dimensions 2.0 m X 0.25 m.	Federal Way
39.2		0385 RM 1.25	Hydrology	S,DI 86-1281	Channel downcutting and severe bank erosion causing bank failure and loss of property in vicinity of S. 304th St. & 10th Ave. S.	Federal Way

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
40	No entry					
40.1		0385 RM 1.31	Hydrology Geology	DI 88-0172	Drainage from Easter Lake is eroding the channel/ravine on 10th Ave S. near S. 306th St. Piped outfalls to ravine not stabilized. Streets in area are prone to flooding if not well maintained.	Federal Way
40.2		0385 Lake	Hydrology	S	Flooding around Easter Lake perimeter. During 1/9/90, Evergreen Retirement Manor had first floor flooded. Flooding has occurred three times in the last five years.	Federal Way
40.3	NW of R4 Coastal		Hydrology Geology	DI 88-0128	Slope eroding into roadside drainage system aggravated by animal burrowing on the slope. Eroded materials are clogging private drainage system in vicinity of 1st Ave S. & Del Ray Park Drive.	Federal Way
40.4	R4	Off Channel	Hydrology	DI 90-0036	R/D pond at 3rd Ave. S. and S. 308th St. full and not draining. This pond has filled before flooding a residence.	Federal Way
40.5	W of 0385 Coastal		Geology	S	Zone of unstable soils and past landslide activity, between 2nd and 7th Ave. S.W. north of S.W. 297th St.	Federal Way
40.6	W of 0385 Coastal		Geology	R,S	Large, old landslide is still active. Erosion around headscarp north of S.W. 295th and west of 7th Ave. S.W.	Federal Way
40.7	W of 0385 Coastal		Geology	R	Surface erosion and gully in pasture above Adelaide.	Federal Way
40.8	W of 0385 Coastal		Geology	S	Gully erosion in rear yard at S.W. 295th St. and 11th Ave. S.W. has initiated headward-progressing	Federal Way
40.9	(formerly 41)	0386 RM 0.00-0.03	Geology	R	Gully, bank erosion in sewage treatment plant construction area.	Federal Way
40.10		0386 RM 0.23 (QL1)	Water Quality	M	Dissolved oxygen (DO), turbidity, and TSS concentrations (monitored during baseflow conditions) were	Federal Way

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					generally good and "better" in comparison to the 44 routine stream and river sites (median values) during the same period in Metro's Freshwater Assessment Program. No sample for DO, temperature, and pH exceeded DOE Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period. During baseflow conditions, NO <sub>3</sub> + NO <sub>2</sub> concentrations were high (only one other stream in King County routinely monitored by Metro had values as high).	
40.11		0386 RM 0.50	Geology	S	Active streamside landsliding; gullyng down unmapped left-bank tributary.	Federal Way
40.12		0386 RM 0.23 (QL1)	Water Quality	S	NO <sub>3</sub> + NO <sub>2</sub> concentrations were relatively low during storm events (i.e., 3.5 times as low as measured during baseflow conditions). Relatively high concentrations of TP, TSS, Cu, Pb, Zn, and fecal densities during storm events. Potential sources include: fertilizers, soil erosion, automobiles, failing on-site septic systems, and sewer line leaks. Potential effects of these pollutants on beneficial uses and other attributes include: eutrophication and nuisance growths of algae, toxicity to both freshwater and marine aquatic species, reduced spawning success of resident trout and anadromous salmon species, and limited recreational activities (e.g., shellfish harvesting).	Federal Way
40.13		0386 RM 0.33	Geology	DI 86-1280	In 1986 STP construction site was hydroseeded but insufficient vegetation to prevent gullyng and sediment transport. Vegetation was reestablished by 1989.	Federal Way



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40.14		0386 RM 0.50	Geology	S	Active streamside landsliding; gullying down unmapped left-bank tributary.	
41		0386 RM 0.60	Habitat	R,S	Culvert outlet drops 24" to water level with no pool forming upstream migration barrier. Downstream bank failures common; channel dimensions 3.0 m X 0.40 m.	Federal Way
41.1	R6	<u>Off Channel</u>	Hydrology	C	Flooding at intersection of S.W. 323rd St. & 26th Ave. S.W. during 1/9/90 storm.	Federal Way
41.2	L2	<u>Off Channel</u>	Geology Hydrology	DI 88-0614	Stormwater flowing down the south side of SW 308th Pl. at 26th Ave. SW to a ravine that is starting to erode. Resident concerned about sewer line under private road eroding.	Federal Way
41.3		0387 RM 0.35 (QL2)	Water Quality	S	Relatively high concentrations of Cu and fecal densities during storm events. Potential sources include: roadway runoff and auto- mobiles; Decatur High School parking lot; failing on-site sep- tic systems, sewer line leaks. Potential effects include: tox- icity to freshwater aquatic species and limited recreational activi- ties.	Federal Way
41.4		0386 RM 0.75	Geology	S	2'-high knickpoint migrating upchannel; channel dimensions above 2.0 m X 0.20 m in relatively stable channel.	Federal Way
41.5		0386 RM 0.90	Geology	S	Active erosion down unmapped right- bank tributary.	Federal Way
41.6		0386 RM 1.10	Geology	S	Active incision along channel below culvert outlet. Channel dimen- sions 1.5 m X 0.25 m.	Federal Way
41.7		0386 RM 1.15	Geology	S	Upstream migrating knickpoint incising 1-2'; channel dimensions 1.0 m X 0.15 m.	Federal Way

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<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
42		0386 RM 1.25	Hydrology	R	Trib. 0386 degraded from increased development. Wetland 3309 acting as a natural detention point for tributary. Wetland is the site of the County Lakota Creek Stormwater Capital Improvement Project.	Federal Way
42.1		0386 Lake	Hydrology Habitat	S,DI 88-0452 87-0861 87-0883	Over 1,000 yards of fill 2'-4' thick placed in Mirror Lake outlet (wetland) blocking the channel at S.W. 316th St. and 4th Ave. S.W. Even without the outlet blocked, residents concerned about rapidly rising lake level during wet weather.	Federal Way
42.2	L6	<u>Off Channel</u>	Hydrology	DI 88-0162	Drainage ditch filled not able to handle runoff. Filling may encroach on County easement. Complainant experiencing flooding in yard in vicinity of S.W. 317th St. & 10th Pl. S.W.	Federal Way
42.3	L7,WH14	<u>Off Channel</u>	Hydrology	DI 87-0172 86-1161	Localized flooding in Alderbrook Area, Pond 1, S.W. 324th St. & 13th Ave. S.W.	Federal Way
42.4	M2	<u>Off Channel</u>	Hydrology	DI 90-0220	Four inches of water in residence on 7th Ave. S.W. and S.W. 326th St. during 1/9/90 storm.	Federal Way
42.5	M3	<u>Off Channel</u>	Hydrology	C	Flooding on 1st Ave. S. near S. 316th St. during 1/9/90 storm.	Federal Way
43	No entry					
44	See 41.9					
44.1		0387 RM 0.05	Geology	S	Channel dimensions 2.0 m X 0.25 m. Incision 1-2', fine sediments cementing stream gravels.	Federal Way
45		0387 RM 0.19	Habitat	R,S	Culvert outfall to rocks is a fish barrier. Downstream scour and lateral incision causing bank failures up to 10-12' high.	Federal Way
46		0387 RM 0.30-0.50	Geology	R,S	Channel erosion 1-2' deep downstream of Decatur H.S.; deposition at confluence with trib. 0386.	Federal Way

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46.1		0387 RM 0.35 (QL2)	Water Quality	S	Relatively high concentrations of Cu and fecal densities during storm events. Potential sources include: roadway runoff and automobiles; Decatur High School parking lot; failing onsite septic systems, and sewerline leaks. Potential effects include: toxicity to freshwater aquatic species and limited recreational activities.	Federal Way
47		0387 RM 0.80	Habitat Water Quality	R	Nutrient loading from fertilizers, herbicides, and pesticides is damaging Lake Ponce De Leon.	Federal Way
47.1	L5 formerly Item 1, Hylebos Creek Basin Observed Conditions Summary)	0387 RM 1.60	Hydrology	R	Apparent lack of problems in 1985 in vicinity of SW 336th and 21st Ave. SW (proposed project site 2422) due to high infiltrative gradients, and moderate development (evidenced by undefined surface drainage course).	Federal Way
47.2	L5	0387 Lake	Hydrology	DI 86-0567	Outlet pipe to Lake Ponce De Leon deteriorating behind 2526 S.W. 323rd St. on the lake.	Federal Way
47.3	L8	<u>Off Channel</u>	Hydrology	DI 89-0835	Cedardale and Parkway Apts. R/D ponds overtopped flooding dip in road on S.W. 336th St. at 22nd Pl. S.W. Road closed during 12/89 storm.	Federal Way
47.4	L8	<u>Off Channel</u>	Hydrology	DI 90-0029	Four-5' water on one stretch of road flooded S.W. 336th St. at 25th Ln. S.W. during 1/9/90 storm.	Federal Way
48	No entry					
48.1		0388 RM 0.00-0.06	Habitat	S	Six-8' wide X 3-4' deep stream through yard of home to the sand and gravel tideflats. The substrate is pebble-cobble-sand, and consists entirely of riffles, with no cover or LOD, and only fair spawning habitat.	Federal Way
49		0388 RM 0.03	Habitat	R	Heavy sedimentation.	Federal Way

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49.1		0388 RM 0.06-0.18	Habitat	S	The stream enters second growth cedar with a cottonwood, alder, and vine maple overstory (<20 = dbh), and ferns dominating the understory; 60-80% canopy cover; increasing LOD upstream; no bank cover. A 1.75' (max) deep 13 sq.ft. pool (the first pool) is formed by cedar logs. The first failure (left bank) is 2,000 cubic feet. Spawning gravels are good, and understory cover from salmon berry becomes thick upstream.	Federal Way
49.2		0388 RM 0.07 (QJ1)*	Water Quality	M	Dissolved oxygen (DO), turbidity, and TSS concentrations (monitored during baseflow conditions) were generally good and "better" in comparison to the 44 routine stream and river sites (median values) during the same period in Metro's Freshwater Assessment Program. No sample for DO, temperature, pH, and fecal exceeded Washington Department of Ecology (DOE) Water Quality Criteria - Class A (Excellent) for this baseflow monitoring period. NO <sub>3</sub> + NO <sub>2</sub> , TP concentrations higher than other routinely monitored King County streams during baseflow conditions.	Federal Way
49.3		0388 RM 0.07 (QJ1)*	Water Quality	S	Relatively high concentrations of TP, Cu, TSS, and fecal densities during storm events. Potential sources of these nonpoint pollutants include: fertilizers, automobiles, soil erosion, failing on-site septic systems, and sewerline leaks. Potential effects of these pollutants on beneficial uses and other attributes include: eutrophication and nuisance growths of algae, toxicity to both freshwater and marine aquatic species, reduced, spawning success of resident trout, and	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					limited recreational activities (e.g., shellfish harvesting).	
49.4		0388 RM 0.15	Geology	S	Old mass movements on adjacent hillsides; moderate stream ero- sion. Channel dimensions 6.0 m X 0.25 m.	Federal Way
49.5		0388 RM 0.18-0.29	Habitat	S	The substrate consists mainly of pebble-cobble-sand with pockets of cobble-rubble. Thick understory cover (20-80%) salmon berry and thimbleberry overhanging channel. There are 4 or 5 medium sized jams of medium and large woody debris (all passable), but none with large pools; largest pool is 12 sq.ft. and 1.5 (max.) deep. Significant recent sand deposition has partially filled many pools.	Federal Way
49.6		0388 RM 0.30	Habitat Geology	S	About 12 alders (8-24" dbh) newly down due to a 4,500 cubic ft. failure on the right bank.	Federal Way
49.7		0388 RM 0.31-0.44	Habitat Geology	S	Understory thins to an average of 30%; alder canopy thins to 0-50% with 1-5" dbh (diameter at breast height) hemlock reproduction. A 1.25' falls with a 1.25' deep (max.) plunge may be a barrier during moderate and low flows. A 12 sq. ft. 1.5' deep (max.) pool due to LOD, along with a 2.0' deep (max.) 16 sq. ft. pool at the bottom of a section of cascades are the only pools. These cascades are probably barriers at low and moderate flows. A small tributary off right bank (0.05 cfs) is downcut 1-2'. Good spawning habitat in pebble- cobble channel. Heavy LOD with sand deposition.	Federal Way
49.8		0388 RM 0.45-0.65	Habitat	S	The stream braids through a 50-70' wide valley (stream is 4-9' wide, 2-4" deep) with 80-150' high,	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					40-50% slopes. Canopy is 6-20" alder with some cottonwood, hemlock, and Douglas fir. LOD is still heavy (mostly individual old cedars partly buried in channel or embedded in banks). Excellent wildlife corridor. A jam of medium-sized woody debris is probably impassable at low flows (could easily be made passable). A small 16 sq. ft. 1.25' deep (max.) pool occurs at RM 0.50, 0.05 miles downstream of a 2.0' deep (max.) 40 sq. ft. pool with no brush cover and a 50% tree canopy. Both pools are formed by LOD which provides some cover. One 4-6" (1n length) salmonid was seen here. Several trickling tributaries drain the left and right slopes through devil's club with 40-80%, 120' high slopes above. A 2.0' deep (max.) 45 sq. ft. pool at RM .57 with good vine maple cover is due to two old cedars, with a 10 sq. ft. 1.25' deep (max.) pool 0.06 miles upstream.	
50		0388 RM 0.55	Habitat	R,SW	Debris jam exists. Directed flow has initiated a 20'-high failure on left bank. Local bank incision up to 2'; heavy sand sedimentation.	Federal Way
50.1		0388 RM 0.66-0.71	Habitat	S	A 1.75' tall (and 1.5' wide) falls is probably impassable; a 2.0' deep (max.) 42 sq. ft. pool is at the top of falls. Just downstream at RM 0.69 a small jam of medium and large woody debris may be a barrier at low flows (there may be passage under debris). At RM 0.70 braiding begins under a relatively open canopy. The valley is 60-100' wide with 60-80' high slopes of 40-70%.	Federal Way
50.2		0388 RM 0.72	Habitat Hydrology	S	An 18' p.v.c. pipe drains a detention pond from a freshly cleared	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					housing development above the right slope; it outfalls in the channel into a gabion wall. The pipe (and possibly the pond) may be undersized, and that barrel velocities would be extreme during peak flows.	
50.3		0388 RM 0.73-0.88	Habitat Geology	S	A 300 sq. ft. 2-12' deep pool has partially filled with sand. Understory on slopes is much more open, dominated by sword fern. Douglas fir becomes numerous (18-24" dbh) with alder still dominant. Some LOD in channels is now new alder (vs. virtually all old cedar downstream). A 1,500 cubic foot failure on the right bank has deposited sands into a jam of medium and large woody debris at its base. Water flows over a 3' falls and winds under the jam; this is probably impassable at low flows and pools are absent. A 2,000 cubic foot 15' high X 25' wide bank failure in very sandy soils occurs at RM 0.82. Another jam at RM 0.84 has created a 4' falls that is definitely impassable at all but high flows when backwatering may allow passage. Spawning gravels are pebble-cobble or cobble-pebble with low fines in majority of riffles.	Federal Way
50.4		0388 RM 0.75	Geology	S	Minor, localized bank failures; abundant woody debris protecting channel from more severe erosion.	Federal Way
51		0388 RM 0.85	Habitat Water Quality	R	Leachate and debris from fill enters stream.	Federal Way
51.1		0388 RM 0.89-1.02	Habitat Geology	S	A 2 cfs 200' tributary seeps from right slope just downstream from the golf course driving range. The right bank of the main channel parallels the range until it	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					enters a 36" culvert and crosses under SW 320th St. A 2-5' fill along this stretch is caving in at many spots. The stream averages 6' wide and 2-4" deep with a pebble-cobble or cobble-pebble substrate, much of it choked with metal and wood debris and is impassable, although debris is easily cleared.	
51.2		0388 RM 1.00 (QJ2)	Water Quality	S	Relatively high concentrations of Cu during storm events. Potential sources include road runoff from automobiles (e.g., thrust bearings, bushing and brake linings). Addition of copper sulfate to lakes or clogged pipes. Potential effects could include toxicity to both freshwater and marine aquatic species.	Federal Way
51.3		0388 RM 2.27	Hydrology	DI 86-1091 86-1080	Soil put into channel is blocking stream channel at S.W. 333rd St. & 43rd Ave. S.W. Up to 4-inch cuts near creek. Possible change made to streambed in response to flooding of trailer from golf course pumping water.	Federal Way
51.4		0388 approx. RM 3.25	Hydrology Water Quality	C	New housing developments have caused sediment from construction to enter stream and lakes. Approx. 120 acres were cleared in fall of 1989.	Tacoma
53		0388 RM 0.90-1.00	Geology	R,S	Erosion of channel banks in filled valley.	Federal Way
53.1		0388 RM 1.02-1.23	Habitat	S	The fork with 0389 currently provides no salmonid habitat.	Federal Way
53.2		0388 RM 1.23-1.50/ Lakes	Habitat Water Quality	S	The shoreline of Lake Jeane is residential to the lake edge--virtually no riparian habitat remains. Lake Jeane is used as a water source for golf course irrigation. The lakes are connected by a 300' open channel (half of which is riprapped). The shoreline of Lake Lorene is residential except for the community	Federal Way



LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					park (lawns with trees) or the south shore. There are stranded reaches of good salmonid habitat just upstream of Lorene. Resident fish in Jeane and Lorene Lakes could pass upstream into 0388, reaching up to SW 335th St. where the stream is 1' wide and 2-3" deep. There is a several hundred feet long and 150'-200' wide wetland of high habitat value starting at SW 329th St. and paralleling Hoyt Road. This is a barrier at low flows and may be at all flows.	
53.3		0388 Lakes	Hydrology	C	During 1/9/90 storm, Jeane and Lorene Lake levels rose flooding 5-7 residences.	Federal Way
53.4	J1	Off Channel	Hydrology Habitat	C	During 1/9/90 storm Twin Lakes Golf Course's duck pond flooded.	Federal Way
53.5	N of 0388 Coastal		Geology	R,S	Severe erosion of coastal bluff by ill-controlled upland runoff on west-central Dumas Bay.	Federal Way
53.6	(formerly 52)	0388A RM 0.10	Hydrology Water Quality	R	Poor installation of new culvert, exposing 8" sanitary sewer line in drain flow path (4th & SW 293rd). Iron sewer pipe is corroding, contributing significant amounts of iron oxide into swale below.	Federal Way
54		0389 RM 0.19-0.90	Hydrology Geology	C,R,S DI 86-1201 86-0204 86-1033	New development has increased tributary flows, resulting in severe channel incision, channel erosion, and bank instability. Gabion dams have been placed upstream to attenuate flows, but erosion is still active on slopes with residences above. Channel dimensions 2.0 m X 0.30 m. Incision of swale in Olympic View Park (Woodridge Park Ravine) due to increase in surface runoff. Erosion of sand and gravel, particularly severe at RM 0.25.	
55	No entry					
56	W of 0392B Coastal		Geology	R,S	Recent rotational landslide on bluff in state park.	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
56.1		0390 RM 0.00-0.25	Habitat	S	All three branches of this system pass through the wildlife sanctuary at Dumas Bay. Each of the branches is 2-3' wide and 2-3" deep at most (av. 2' X 1.5") and none have any pools. All have good canopy and fair to good understory cover. There is little to LOD (with a few exceptions). The lower 0.05 miles of the middle and eastern forks is a cattail and skunk cabbage wetland with no distinct channel and no fish passage at low flows, and possibly none at any stage. There is an 18" drop at the outfall of a 24" culvert 100' upstream from the mouth of the western fork which makes it impassable at low (and probably high) flows. There is a 3-5' downcut at RM 0.15.	Federal Way
57	No entry					
58		0391A RM 0.00	Habitat Geology	R	Heavy sedimentation; gravels silted.	Federal Way
58.1		0391A RM 0.00-0.18	Habitat Geology	R,S	This tributary enters 0392B at RM 0.18. Incision of alluvium at confluence of tributary and stream, probably due to increased runoff from development on plateau. At the confluence it is 3-4' wide and 1-2.5" deep, with maximum depths of 7" and no pools. There is heavy sand deposition with pockets of pebble-cobble. Chunks of old LOD help stabilize the channel, which is downcut as deep as 4-5' where it is 7-8' wide. Salmonberry, thimbleberry, and nettles are heavy, with 6-24" dbh alder and big leaf maples on 5-20% slopes.	Federal Way
58.2		0391A RM 0.07	Habitat Geology	S	A 10,000 cubic foot rotational failure on the left slope starts at a slope break 20' away from a	Federal Way

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					new home; the toe of the failure runs to within 20' of the stream.	
58.3		0391A RM 0.08-0.17	Habitat	S	The valley narrows to 40-60' with 80-100' high slopes of 60-80%. The channel is 3-5' wide and 1-2' deep. Medium and large woody debris is plentiful, but the gradient increases to 4% and there are no pools. Cut banks 4-8' high and 3-5' downcutting begins at RM 0.12 and continues upstream where it worsens.	Federal Way/ Pierce County
58.4		0391A RM 0.18	Habitat	S	The first major debris jam is impassable at most or all flows (5' drop over and through medium and large woody debris). The slopes are still very sandy: existing chunks of LOD have prevented much worse downcutting. The gradient steepens to 75% above this, which is the upper limit of salmonid habitat.	Pierce County
58.5		0391A RM 0.50	Geology	S	Many ravine-wall landslides in this area of creek, from both incision and upland runoff.	Pierce County
59		0391A RM 0.65	Habitat	R	Debris jam restricts passage.	Pierce County
60	No entry					
60.1		0392B RM 0.00-0.04	Habitat Geology	S	The 4-5' wide and 2-3' deep stream passes from the sand tideflats through 0.02 miles of riprapped channel and 0.02 miles of natural channel through a group picnic area; neither stretch has fish habitat due to lack of cover and pools.	Pierce County
60.2		0392B RM 0.04-0.17	Habitat Water Quality	S	Canopy of big leaf maple and alder increases to an average of 70%; understory channel cover averages flows 30% (0-70%). Substrate is pebble-cobble-sand, or sand-pebble;	Pierce County

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
					<p>spawning habitat is poor due to 1st high sand content. A drainage ditch encircling the picnic area parking lot enters the stream at RM 0.03 and 0.04; the lot is big enough to produce heavy pulses of runoff contaminants. There are no pools and no LOD below RM 0.07. There are several new alders down at RM 0.07. There are several new alders down at RM 0.07, but otherwise most LOD is old cedar.</p>	
60.3		0392B RM 0.18	Habitat	S	0391A (a tributary) meets the stream, increasing total discharge by about 30%.	Pierce County
60.4		0392B RM 0.19-0.39	Habitat	S	<p>The stream is 5-7' wide and 2-3" deep in a 150' wide valley. Substrate is very sandy with pockets of good pebble-cobble. There are cut banks 0-2' high and medium to very heavy salmonberry and red elder (and skunk cabbage near the channel in the lower section) that thin out to an open understory of salmonberry and swordfern upstream. 40-60%, 100' high slopes have 6-24" dbh alder, big leaf maples, hemlock, and Douglas firs; conifers dominate upstream. Very good LOD loading upstream of RM 0.24, but pools average less than 8" deep. The first boulders occur at RM 0.22 where the gradient increases to 4% or more. Most LOD is old cedar but some is newer alder and big leaf maple. Two tributaries drain the left slope near RM 0.24; the larger is 2' wide and 2" deep, the smaller is 1' wide and 2" deep.</p>	Pierce County
60.5		0392B RM 0.40	Habitat	S	A 4' falls (lacking a plunge pool) may be passable at very high flows when water passes around the falls.	Pierce County

LOWER PUGET SOUND BASINS  
OBSERVED CONDITIONS

<u>Item<sup>1</sup></u>	<u>Modeled Subcatch.# &amp; Reach #</u>	<u>Trib. &amp; River Mile<sup>2</sup></u>	<u>Subject</u>	<u>Data Source</u>	<u>Existing Conditions Description</u>	<u>Entity</u>
60.6		0392B RM 0.42	Habitat	S	The stream forks into equal sized cascading channels of 75% gradient. The substrate is rubble-cobble with frequent boulders. Canopy cover is 50-100% (mostly Douglas fir and alder) and understory cover over the channel averages 15% (mostly salmonberry). There are 3-4' falls at the bottom of each fork: this is the top of potential salmonid habitat.	Pierce County
60.7	(formerly 60)	0392B RM 0.09	Hydrology	R	R/D construction to mitigate peak flows for new housing development not receiving any flow. R/D installed at wrong location to receive flows (51st Place SW & SW 325th Place).	King County

**A P P E N D I X   C**

**MODELED HSPF FLOW FREQUENCIES  
AND DURATIONS BY SUBCATCHMENT**

Table C.1  
17-May-90 MODELED FLOW FREQUENCIES UNDER VARIOUS LAND USE SCENARIOS

FOREST= Pre-developed Land Use  
1987= 1987 Land Use  
FH= Future High Land Use Without Detention

Sub-Basin	Land Use	-----Peak Annual Flow Frequency (CFS)-----								Mean of 2-100 Yr Flows
		1.01-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	
H KITT	1987	23.1	40.5	46.8	50.0	53.2	55.2	56.9	60.1	50.4
H1	1987	52.0	119.0	163.0	193.0	231.0	260.0	290.0	361.0	209.3
H10	1987	2.1	4.7	7.1	9.0	11.9	14.5	17.4	25.8	10.8
H11	1987	2.3	6.5	9.3	11.1	13.5	15.3	17.2	21.5	12.1
H12	1987	0.8	1.9	3.0	4.0	5.6	7.1	8.9	14.7	5.1
H1+WH1	1987	111.0	236.0	318.0	374.0	446.0	500.0	556.0	692.0	405.0
H2	1987	4.8	11.9	16.7	19.9	24.0	27.2	30.4	38.1	21.7
H3	1987	9.2	22.2	29.8	34.5	40.2	44.3	48.2	57.1	36.5
H4	1987	43.4	87.3	111.0	125.0	142.0	153.0	165.0	190.0	130.6
H5	1987	8.1	17.1	22.8	26.6	31.4	35.0	38.7	47.4	28.6
H6	1987	35.6	71.2	89.0	99.4	111.0	120.0	127.0	144.0	102.9
H7	1987	0.7	3.7	5.4	6.3	7.2	7.7	8.2	9.0	6.4
H8	1987	13.6	31.3	42.1	49.1	57.8	64.2	70.5	85.2	52.5
H9	1987	23.6	44.4	56.5	64.2	73.8	80.8	87.7	104.0	67.9
J1	1987	45.8	93.8	119.0	134.0	151.0	163.0	175.0	200.0	139.3
J2	1987	6.4	11.9	16.3	19.7	24.4	28.3	32.5	44.0	22.2
J3	1987	8.5	17.0	22.5	26.2	31.0	34.5	38.2	47.0	28.2
J4	1987	27.6	56.5	70.6	78.8	88.1	94.5	100.0	113.0	81.4
J5	1987	27.1	55.9	70.3	78.6	88.1	94.6	101.0	114.0	81.4
J6	1987	6.7	13.3	18.1	21.6	26.3	30.1	34.1	44.4	23.9
J7	1987	0.03	0.04	0.07	0.10	0.18	0.28	0.44	1.25	0.2
J8	1987	3.4	7.5	11.2	14.3	19.0	23.1	27.8	41.7	17.1
L PONCE	1987	7.2	17.0	23.1	27.2	32.3	36.0	39.8	48.6	29.2
L1	1987	30.8	57.7	72.1	81.0	91.6	99.2	106.0	123.0	84.6
L2	1987	30.8	57.8	72.5	81.5	92.4	100.0	108.0	125.0	85.4
L3	1987	18.1	33.0	40.8	45.5	51.2	55.2	59.1	67.7	47.5
L4	1987	11.1	23.2	30.4	35.1	40.9	45.2	49.4	59.4	37.4
L5	1987	12.7	24.2	30.3	34.1	38.7	41.9	45.0	52.0	35.7
L6	1987	4.1	9.6	11.2	11.9	12.5	12.7	13.0	13.3	11.8
L7	1987	17.4	33.0	42.4	48.6	56.2	61.9	67.6	81.1	51.6
M1	1987	0.4	0.7	1.0	1.2	1.4	1.6	1.8	2.3	1.3
M3	1987	CLOSED BASIN								
R1	1987	29.0	60.1	77.1	87.4	99.8	109.0	117.0	136.0	91.7
R2	1987	9.4	21.6	28.4	32.7	37.7	41.3	44.8	52.5	34.4
R3	1987	0.2	2.1	4.5	6.3	8.9	11.0	13.1	18.3	7.6
R4	1987	17.2	37.6	48.0	54.0	60.9	65.6	70.0	79.3	56.0
R5	1987	10.5	19.7	24.3	27.0	30.1	32.2	34.2	38.4	27.9
R6	1987	2.1	4.3	5.9	7.2	8.9	10.3	11.8	15.7	8.1
S1	1987	51.3	107.0	136.0	153.0	173.0	186.0	199.0	228.0	159.0
S2	1987	50.2	107.0	137.0	154.0	174.0	187.0	200.0	228.0	159.8
S3	1987	18.9	41.1	53.2	60.5	69.2	75.3	81.1	94.0	63.4
S4	1987	22.4	47.2	60.5	68.5	78.0	84.7	91.1	105.0	71.7
S5	1987	17.4	36.9	47.5	54.0	61.7	67.2	72.5	84.2	56.6
S6	1987	2.3	4.8	6.6	7.9	9.7	11.1	12.5	16.3	8.7

Table C.1

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FOREST= Pre-developed Land Use

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FH= Future High Land Use Without Detention

Sub-Basin	Land Use	Peak Annual Flow Frequency (CFS)								Mean of 2-100 Yr Flows
		1.01-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	
S7	1987	CLOSED BASIN								
S8	1987	10.7	23.8	32.0	37.4	44.3	49.4	54.6	66.8	40.3
S9	1987	17.7	33.0	40.9	45.7	51.4	55.3	59.1	67.6	47.6
W1	1987	24.0	47.7	60.9	69.1	78.9	86.0	92.8	108.0	72.6
W2	1987	14.0	27.4	34.8	39.3	44.7	48.6	52.4	60.8	41.2
WH UW	1987	38.8	71.5	93.5	109.0	129.0	145.0	161.0	201.0	118.2
WH1	1987	62.9	121.0	161.0	189.0	227.0	257.0	287.0	365.0	207.0
WH10	1987	22.6	39.0	47.0	51.6	57.0	60.7	64.1	71.6	53.2
WH11	1987	48.1	76.7	93.2	104.0	117.0	127.0	137.0	160.0	109.2
WH13	1987	CLOSED BASIN								
WH2	1987	60.6	115.0	154.0	181.0	217.0	245.0	275.0	351.0	197.8
WH3	1987	27.5	48.5	59.5	66.2	74.2	79.9	85.3	97.5	68.9
WH4	1987	42.7	79.0	106.0	125.0	151.0	172.0	194.0	251.0	137.8
WH5	1987	33.7	61.6	80.1	92.8	109.0	122.0	135.0	168.0	100.1
WH6	1987	1.6	3.1	4.1	4.7	5.5	6.1	6.7	8.2	5.0
WH7	1987	4.6	8.3	11.6	14.2	18.0	21.3	25.0	35.5	16.4
WH8	1987	44.7	83.9	108.0	123.0	143.0	158.0	172.0	208.0	131.3
WH9	1987	0.9	1.5	2.1	2.6	3.3	3.9	4.5	6.4	3.0
H KITT	FOREST	4.9	16.2	25.5	32.4	42.0	49.7	57.8	79.0	37.3
H1	FOREST	25.2	58.2	85.8	107.0	138.0	164.0	192.0	270.0	124.2
H10	FOREST	1.7	4.2	6.3	7.9	10.2	12.1	14.3	20.2	9.2
H11	FOREST	1.1	3.9	6.2	7.8	9.9	11.6	13.4	17.7	8.8
H12	FOREST	0.6	2.1	3.4	4.6	6.3	7.8	9.5	14.6	5.6
H1+WH1	FOREST	47.7	113.0	165.0	204.0	260.0	306.0	356.0	489.0	234.0
H2	FOREST	3.1	6.7	9.6	11.8	14.9	17.3	20.0	27.3	13.4
H3	FOREST	4.2	10.3	15.0	18.5	23.2	27.0	31.1	41.7	20.9
H4	FOREST	13.6	40.0	60.9	76.4	97.7	115.0	133.0	180.0	87.2
H5	FOREST	3.1	8.8	12.7	15.4	18.8	21.4	24.1	30.5	16.9
H6	FOREST	10.3	32.2	49.7	62.8	80.8	95.2	111.0	150.0	72.0
H7	FOREST	0.6	3.2	4.5	5.2	5.8	6.2	6.4	6.9	5.2
H8	FOREST	4.9	15.2	23.2	29.1	37.1	43.5	50.2	67.4	33.1
H9	FOREST	4.9	16.4	26.4	34.1	45.0	54.0	63.9	90.2	40.0
J1	FOREST	8.7	24.1	35.6	44.0	55.4	64.5	74.0	98.2	49.6
J2	FOREST	3.2	6.7	9.2	11.0	13.5	15.4	17.5	22.7	12.2
J3	FOREST	3.6	7.5	10.3	12.3	15.0	17.1	19.4	25.1	13.6
J4	FOREST	3.7	14.5	23.6	30.4	39.6	47.0	54.7	74.5	35.0
J5	FOREST	3.8	14.9	24.2	31.1	40.7	48.4	56.4	77.1	36.0
J6	FOREST	1.1	2.7	4.4	6.0	8.4	10.6	13.2	21.4	7.5
J7	FOREST	0.031	0.041	0.068	0.103	0.183	0.283	0.441	1.250	0.2
J8	FOREST	0.4	1.3	2.4	3.6	5.6	7.7	10.4	20.1	5.2
PONCE	FOREST	1.4	3.5	5.3	6.6	8.6	10.2	12.0	17.0	7.7
L1	FOREST	4.9	9.9	14.3	17.8	22.9	27.2	32.1	45.9	20.7
L2	FOREST	4.6	9.7	14.0	17.5	22.5	26.7	31.4	44.6	20.3
L3	FOREST	1.8	5.4	8.5	10.8	14.1	16.8	19.7	27.5	12.5



Table C.1  
17-May-90 MODELED FLOW FREQUENCIES UNDER VARIOUS LAND USE SCENARIOS

FOREST= Pre-developed Land Use  
1987= 1987 Land Use  
FH= Future High Land Use Without Detention

Sub-Basin	Land Use	Peak Annual Flow Frequency (CFS)								Mean of 2-100 Yr Flows
		1.01-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	
L4	FOREST	1.8	4.0	5.8	7.2	9.3	11.0	12.8	18.0	8.4
L5	FOREST	1.4	3.5	5.3	6.6	8.6	10.2	12.0	17.0	7.7
L6	FOREST	0.9	3.2	5.3	7.0	9.6	11.8	14.2	21.0	8.5
L7	FOREST	2.3	6.2	9.6	12.3	16.2	19.6	23.3	33.6	14.5
M1	FOREST	0.2	0.4	0.6	0.7	0.8	0.9	1.0	1.3	0.8
M3	FOREST	CLOSED BASIN								
R1	FOREST	2.8	8.9	15.9	22.2	32.6	42.5	54.5	93.0	29.4
R2	FOREST	1.7	4.3	7.0	9.3	13.0	16.4	20.3	32.5	11.7
R3	FOREST	0.2	0.5	1.1	2.1	5.0	9.4	17.6	75.1	5.9
R4	FOREST	2.6	8.8	14.3	18.7	24.9	30.0	35.7	50.9	22.1
R5	FOREST	1.2	4.0	6.5	8.4	11.4	13.8	16.6	24.2	10.1
R6	FOREST	0.7	1.4	1.9	2.3	2.9	3.4	3.9	5.2	2.6
S1	FOREST	12.1	35.3	51.8	63.3	78.3	89.7	101.0	130.0	69.9
S2	FOREST	11.5	34.6	51.1	62.5	77.3	88.7	100.0	128.0	69.0
S3	FOREST	5.8	17.2	24.4	29.0	34.7	38.7	42.7	51.7	31.1
S4	FOREST	4.6	13.7	21.0	26.5	34.1	40.3	46.9	64.2	30.4
S5	FOREST	3.5	10.6	16.5	20.8	26.9	31.8	37.1	51.0	24.0
S6	FOREST	0.9	1.8	2.6	3.1	3.9	4.6	5.3	7.2	3.6
S7	FOREST	CLOSED BASIN								
S8	FOREST	4.5	12.9	18.2	21.6	25.7	28.7	31.6	38.2	23.1
S9	FOREST	4.3	10.0	14.2	17.2	21.3	24.5	27.9	36.6	19.2
W1	FOREST	4.2	14.1	21.9	27.7	35.5	41.7	48.3	64.9	31.5
W2	FOREST	2.2	6.9	11.0	14.1	18.5	22.1	26.1	36.8	16.5
WH UW	FOREST	9.8	25.2	36.4	44.4	55.2	63.6	72.4	94.7	49.5
WH1	FOREST	23.1	55.1	80.1	98.8	125.0	146.0	168.0	228.0	112.2
WH10	FOREST	3.1	9.4	13.8	16.9	20.8	23.8	26.8	34.0	18.6
WH11	FOREST	3.6	13.9	23.5	31.2	42.4	51.8	62.3	90.8	37.5
WH13	FOREST	CLOSED BASIN								
WH2	FOREST	21.0	51.0	74.5	92.1	117.0	137.0	158.0	215.0	104.9
WH3	FOREST	5.1	18.1	28.8	36.9	48.1	57.1	66.7	91.6	42.6
WH4	FOREST	12.1	31.0	45.0	55.1	68.6	79.2	90.4	119.0	61.6
WH5	FOREST	6.0	17.3	25.3	30.9	38.2	43.7	49.4	63.3	34.1
WH6	FOREST	0.5	1.9	2.9	3.5	4.3	4.8	5.4	6.6	3.8
WH7	FOREST	3.6	6.8	9.4	11.4	14.4	16.8	19.5	27.0	13.0
WH8	FOREST	7.0	18.6	28.5	36.1	47.0	56.1	66.2	93.4	42.1
WH9	FOREST	0.3	0.8	1.1	1.3	1.6	1.8	2.1	2.7	1.4
H KITT	FH	38.5	57.5	73.3	85.2	102.0	116.0	131.0	171.0	94.2
H1	FH	136.0	259.0	329.0	375.0	430.0	471.0	511.0	604.0	395.8
H10	FH	5.4	13.3	18.3	21.6	25.7	28.8	31.9	39.1	23.3
H11	FH	9.0	17.4	21.5	23.9	26.7	28.6	30.3	34.1	24.7
H12	FH	1.1	6.2	9.0	10.5	11.9	12.8	13.4	14.6	10.6
H1+WH1	FH	239.0	479.0	617.0	705.0	814.0	892.0	970.0	1150.0	746.2
H2	FH	17.3	35.5	46.2	53.1	61.6	67.9	74.0	88.4	56.4
H3	FH	25.7	55.4	70.7	79.8	90.3	97.6	104.0	119.0	83.0

Table C.1

17-May-90 MODELED FLOW FREQUENCIES UNDER VARIOUS LAND USE SCENARIOS

FOREST= Pre-developed Land Use

1987= 1987 Land Use

FH= Future High Land Use Without Detention

Sub-Basin	Land Use	Peak Annual Flow Frequency (CFS)								Mean of 2-100 Yr Flows
		1.01-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	
H4	FH	91.2	153.0	192.0	218.0	252.0	277.0	303.0	366.0	232.5
H5	FH	13.5	29.9	38.2	43.0	48.5	52.2	55.6	62.9	44.6
H6	FH	78.3	124.0	156.0	177.0	205.0	227.0	249.0	305.0	189.7
H7	FH	1.1	6.4	8.9	10.0	10.9	11.4	11.7	12.2	9.9
H8	FH	32.3	64.3	80.6	90.3	102.0	110.0	117.0	133.0	94.0
H9	FH	46.9	81.0	98.1	108.0	120.0	128.0	136.0	153.0	111.9
J1	FH	54.8	115.0	147.0	167.0	190.0	206.0	222.0	256.0	174.5
J2	FH	10.6	25.5	37.3	46.1	58.4	68.4	79.3	108.0	52.5
J3	FH	12.2	28.2	40.6	49.8	62.7	73.1	84.3	114.0	56.4
J4	FH	32.1	65.5	81.3	90.2	100.0	107.0	113.0	126.0	92.8
J5	FH	31.1	65.3	81.4	90.6	101.0	107.0	114.0	126.0	93.2
J6	FH	29.1	45.7	58.3	67.6	80.2	90.4	101.0	130.0	73.9
J7	FH	3.4	5.3	6.8	8.0	9.8	11.2	12.8	17.1	9.0
J8	FH	17.8	28.2	36.4	42.4	50.8	57.7	65.1	84.6	46.8
L PONCE	FH	6.6	16.9	23.1	27.1	31.9	35.5	38.9	46.7	28.9
L1	FH	40.0	71.3	88.0	98.2	110.0	119.0	128.0	146.0	102.4
L2	FH	37.3	68.0	84.6	94.9	107.0	116.0	124.0	144.0	99.1
L3	FH	20.8	38.0	47.0	52.5	58.9	63.5	67.9	77.6	54.6
L4	FH	12.0	24.8	32.4	37.2	43.1	47.5	51.7	61.6	39.5
L5	FH	12.2	23.9	30.2	34.0	38.6	41.8	45.0	51.9	35.6
L6	FH	7.7	9.8	12.6	15.0	18.7	22.1	26.1	38.0	17.4
L7	FH	18.1	35.6	46.0	52.7	60.9	67.0	73.0	87.1	55.9
M1	FH	0.4	0.9	1.1	1.3	1.6	1.8	2.0	2.5	1.5
M3	FH	CLOSED BASIN								
R1	FH	40.2	79.8	102.0	116.0	132.0	144.0	156.0	183.0	121.6
R2	FH	14.2	27.7	35.7	40.9	47.3	52.0	56.6	67.5	43.4
R3	FH	0.6	6.4	8.5	9.2	9.5	9.7	9.7	9.8	8.8
R4	FH	16.5	40.6	52.6	59.3	66.9	71.8	76.4	85.6	61.3
R5	FH	11.8	21.4	26.2	29.1	32.5	34.8	37.0	41.8	30.2
R6	FH	2.2	4.9	6.8	8.1	9.8	11.1	12.5	15.8	8.9
S1	FH	84.9	163.0	199.0	220.0	243.0	258.0	273.0	303.0	226.0
S2	FH	81.9	162.0	200.0	222.0	246.0	263.0	278.0	311.0	228.5
S3	FH	30.7	59.3	73.6	82.1	91.8	98.6	105.0	119.0	85.1
S4	FH	44.6	82.3	101.0	111.0	124.0	132.0	140.0	157.0	115.1
S5	FH	20.6	46.0	59.0	66.6	75.4	81.5	87.1	99.2	69.3
S6	FH	3.1	6.3	8.8	10.6	13.2	15.3	17.5	23.4	12.0
S7	FH	20.2	23.5	25.6	27.0	28.7	30.0	31.3	34.2	27.7
S8	FH	15.1	31.5	40.7	46.4	53.4	58.3	63.2	74.2	48.9
S9	FH	28.1	51.1	64.4	72.9	83.4	91.2	98.8	117.0	77.0
W1	FH	32.3	66.7	84.6	95.3	108.0	117.0	125.0	143.0	99.4
W2	FH	18.0	35.6	44.2	49.2	54.8	58.6	62.2	69.7	50.8
WH UW	FH	75.5	155.0	212.0	252.0	306.0	348.0	393.0	506.0	277.7
WH1	FH	121.0	235.0	311.0	363.0	431.0	484.0	538.0	671.0	393.7
WH10	FH	35.4	55.9	66.3	72.5	79.9	85.1	90.1	101.0	75.0

Table C.1  
17-May-90 MODELED FLOW FREQUENCIES UNDER VARIOUS LAND USE SCENARIOS

FOREST= Pre-developed Land Use  
1987= 1987 Land Use  
FH= Future High Land Use Without Detention

Sub-Basin	Land Use	-----Peak Annual Flow Frequency (CFS)-----								Mean of
		1.01-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	2-100 Yr Flows
WH11	FH	69.1	103.0	126.0	141.0	161.0	177.0	193.0	232.0	150.2
WH13	FH	20.7	77.9	114.0	136.0	162.0	180.0	197.0	233.0	144.5
WH2	FH	117.0	233.0	309.0	360.0	427.0	477.0	529.0	655.0	389.2
WH3	FH	54.1	88.8	106.0	117.0	130.0	138.0	147.0	166.0	121.1
WH4	FH	85.3	172.0	234.0	280.0	341.0	389.0	441.0	573.0	309.5
WH5	FH	53.9	98.5	125.0	143.0	164.0	180.0	197.0	235.0	151.3
WH6	FH	2.6	4.3	5.8	7.0	8.7	10.1	11.7	16.2	7.9
WH7	FH	21.4	72.8	106.0	127.0	153.0	171.0	189.0	228.0	136.5
WH8	FH	78.6	141.0	172.0	191.0	214.0	229.0	244.0	277.0	198.5
WH9	FH	1.2	2.6	4.0	5.0	6.7	8.1	9.7	14.3	6.0

17-May-90

TABLE C.2  
HSPF DURATION DATA

		TABLE NUM	DESCRIPTION																	MODEL SCENARIO						
BASIN: HYLEBOS			1	Fraction of total simulation time flows equal or exceed discharge level.																	1987= 1987 (Calibration land use).					
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987			2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.																	FH= Future land use without on-site detention.					
TIMESTEP: 15 MINUTES			3	Number of excursions at each discharge level.																	FRST= Pre-Developed Land Use.					
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424			4	Average duration of each excursion in table 3. Expressed in timesteps.																						
NUMBER OF DAYS IN ANALYSIS: 14244			5	Standard deviation of duration in table 4. Expressed in timesteps.																						
SUB-BASIN	SCEN-TABLE		0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800	900	1000	1100	MAX	MIN	MEAN	SDEV
WH7	5 1987	1	1	0.08262	0.00147	0.00011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24.87	0	0.5389	1.238
WH7	5 1987	2	1367000	113000	2020	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5 1987	3	1	1982	21	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5 1987	4	1367000	57	96.19	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5 1987	5	1E+30	109.4	74.12	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6 1987	1	1	0.00051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.463	0	0.0965	0.1928
WH9	6 1987	2	1367000	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6 1987	3	1	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6 1987	4	1367000	47.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6 1987	5	1E+30	31.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7 1987	1	1	0.00326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.601	0	0.1454	0.3033
WH6	7 1987	2	1367000	4458	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7 1987	3	1	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7 1987	4	1367000	20.73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7 1987	5	1E+30	35.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8 1987	1	1	0.09122	0.01307	0.00167	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55.63	0	0.7248	2.167
WH10	8 1987	2	1367000	124700	17880	2287	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8 1987	3	1	3881	1693	276	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8 1987	4	1367000	32.14	10.56	8.286	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8 1987	5	1E+30	52.8	11.49	9.308	1.166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 1987	1	1	0.103	0.02349	0.00636	0.00038	0.00004	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	123.7	0	0.9727	3.319
WH11	9 1987	2	1367000	140900	32130	8704	529	60	6	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 1987	3	1	4066	2988	1336	157	32	3	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 1987	4	1367000	34.64	10.75	6.515	3.369	1.875	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 1987	5	1E+30	47.22	10.98	6.59	2.416	0.9601	0.8165	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 1987	1	1	0.2062	0.05948	0.02255	0.00197	0.00043	0.00010	0	0	0	0	0	0	0	0	0	0	0	0	0	142.8	0	2.12	5.859
WH8	10 1987	2	1367000	281900	81330	30840	2698	592	138	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 1987	3	1	2618	2416	1351	171	49	18	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 1987	4	1367000	107.7	33.66	22.83	15.78	12.08	7.667	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 1987	5	1E+30	183.4	34.12	20.36	15.26	8.824	5.715	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 1987	1	1	0.2878	0.05055	0.01775	0.0013	0.00030	0.00004	0	0	0	0	0	0	0	0	0	0	0	0	0	107.9	0	2.24	5.163
WH5	11 1987	2	1367000	393500	69120	24270	1777	417	56	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 1987	3	1	1147	1140	589	63	19	4	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 1987	4	1367000	343.1	60.63	41.2	28.21	21.95	14	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 1987	5	1E+30	444	57.15	32.56	22.32	17.05	5.148	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 1987	1	1	0.322	0.07321	0.02837	0.00253	0.00066	0.00014	0	0	0	0	0	0	0	0	0	0	0	0	0	132.5	0	2.925	6.498
12102920	12 1987	2	1367000	440300	100100	38790	3460	903	205	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 1987	3	1	1115	1176	720	101	28	7	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 1987	4	1367000	394.9	85.13	53.87	34.26	32.25	29.29	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 1987	5	1E+30	546.7	97.23	53.11	26.24	24.39	23.09	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH4	13 1987	1	1	0.3422	0.09098	0.03698	0.00398	0.00099	0.00036	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	158.9	0	3.445	7.571
WH4	13 1987	2	1367000	467900	124400	50570	5450	1357	497	33	0	0	0	0	0	0	0	0	0	0	0	0				
WH4	13 1987	3	1	1171	1121	731	127	34	18	2	0	0	0	0	0	0	0	0	0	0	0	0				
WH4	13 1987	4	1367000	399.6	111	69.18	42.91	39.91	27.61	16.5	0	0	0	0	0	0	0	0	0	0	0	0				

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TABLE C.2  
HSPF DURATION DATA

		TABLE NUM	DESCRIPTION																			MODEL SCENARIO					
BASTN: HYLEBOS			1	Fraction of total simulation time flows equal or exceed discharge level.																			1987= 1987 (Calibration land use).				
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987			2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.																			FH= Future land use without on-site detention.				
Timestep: 15 MINUTES			3	Number of excursions at each discharge level.																			FRST= Pre-Developed Land Use.				
NUMBER OF Timesteps IN ANALYSIS: 1367424			4	Average duration of each excursion in table 3. Expressed in timesteps.																							
NUMBER OF DAYS IN ANALYSIS: 14244			5	Standard deviation of duration in table 4. Expressed in timesteps.																							
SUB-BASIN		SCEN-TABLE		DISCHARGE LEVELS (CUBIC FEET PER SECOND)																							
	RCH	ARIO	NUM	0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800	900	1000	1100	MAX	MIN	MEAN	SDEV
=====																											
WH4	13	1987	5 1	1E+30	587	123.6	70.95	33.99	26.98	19.31	5.5	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	1987	1 1	1	0.1208	0.01349	0.00245	0.00008	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79.22	0	0.9077	2.461
WH3	14	1987	2 1	1367000	165100	18450	3363	122	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	1987	3 1	1	3018	1748	498	30	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	1987	4 1	1367000	54.71	10.55	6.753	4.067	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	1987	5 1	1E+30	111.5	14.78	8.712	3.66	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH2	15	1987	1 1	1	0.8177	0.2322	0.0889	0.01287	0.00345	0.00125	0.00024	0.00006	0	0	0	0	0	0	0	0	0	0	0	232.6	0	8.135	11.04
WH2	15	1987	2 1	1367000	1118000	317500	121600	17600	4718	1719	337	85	0	0	0	0	0	0	0	0	0	0	0				
WH2	15	1987	3 1	1	286	1494	1238	350	125	51	18	3	0	0	0	0	0	0	0	0	0	0	0				
WH2	15	1987	4 1	1367000	3909	212.5	98.19	50.3	37.74	33.71	18.72	28.33	0	0	0	0	0	0	0	0	0	0	0				
WH2	15	1987	5 1	1E+30	8907	518.6	142.6	52.16	37.88	29.8	20.2	30.21	0	0	0	0	0	0	0	0	0	0	0				
WH1	16	1987	1 1	1	0.8322	0.2448	0.09814	0.01556	0.00433	0.00159	0.00037	0.00009	0	0	0	0	0	0	0	0	0	0	0	245.5	0.05773	8.586	11.85
WH1	16	1987	2 1	1367000	1138000	334800	134200	21280	5929	2178	515	126	0	0	0	0	0	0	0	0	0	0	0				
WH1	16	1987	3 1	1	271	1406	1204	378	140	53	19	5	0	0	0	0	0	0	0	0	0	0	0				
WH1	16	1987	4 1	1367000	4199	238.1	111.5	56.29	42.35	41.09	27.11	25.2	0	0	0	0	0	0	0	0	0	0	0				
WH1	16	1987	5 1	1E+30	8769	553.8	165.1	57.31	40.31	32.12	20.28	27.01	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FH	1 1	1	0.3356	0.1444	0.05103	0.00531	0.00146	0.00057	0.00005	0	0	0	0	0	0	0	0	0	0	0	0	186.7	0	4.152	8.783
WH7	5	FH	2 1	1367000	458900	197400	69780	7274	2000	793	72	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FH	3 1	1	1598	577	330	78	24	11	1	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FH	4 1	1367000	287.2	342.2	211.4	93.26	83.33	72.09	72	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FH	5 1	1E+30	552.2	308.7	153.9	56.68	44.62	30.34	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FH	1 1	1	0.00195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.597	0	0.1381	0.2794
WH9	6	FH	2 1	1367000	2666	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FH	3 1	1	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FH	4 1	1367000	44.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FH	5 1	1E+30	35.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FH	1 1	1	0.01075	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.29	0	0.2122	0.4465
WH6	7	FH	2 1	1367000	14700	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FH	3 1	1	716	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FH	4 1	1367000	20.53	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FH	5 1	1E+30	32.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FH	1 1	1	0.09884	0.02484	0.00506	0.00018	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83.52	0	0.9288	3.08
WH10	8	FH	2 1	1367000	135200	33970	6922	256	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FH	3 1	1	4197	2556	740	50	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FH	4 1	1367000	32.2	13.29	9.354	5.12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FH	5 1	1E+30	38.51	13.18	9.034	3.664	1.414	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9	FH	1 1	1	0.1083	0.03425	0.01235	0.00124	0.00025	0.00004	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	176.2	0	1.222	4.538
WH11	9	FH	2 1	1367000	148100	46840	16890	1701	355	68	3	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9	FH	3 1	1	4262	3623	2155	430	119	37	2	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9	FH	4 1	1367000	34.74	12.93	7.838	3.956	2.983	1.838	1.5	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9	FH	5 1	1E+30	33.48	12.69	7.991	3.805	2.169	1.103	0.5	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10	FH	1 1	1	0.1976	0.08137	0.04228	0.00735	0.00219	0.00089	0.00013	0.00000	0	0	0	0	0	0	0	0	0	0	0	203.9	0	2.907	9.008
WH8	10	FH	2 1	1367000	270200	111300	57810	10060	2997	1230	185	3	0	0	0	0	0	0	0	0	0	0	0				
WH8	10	FH	3 1	1	2808	2972	2117	557	212	107	22	2	0	0	0	0	0	0	0	0	0	0	0				

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TABLE C.2  
HSPF DURATION DATA

TABLE NUM

DESCRIPTION

MODEL SCENARIO

BASIN: HYLEBOS

SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987

TIMESTEP: 15 MINUTES

NUMBER OF TIMESTEPS IN ANALYSIS: 1367424

NUMBER OF DAYS IN ANALYSIS: 14244

1

Fraction of total simulation time flows equal or exceed discharge level.

2

Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.

3

Number of excursions at each discharge level.

4

Average duration of each excursion in table 3. Expressed in timesteps.

5

Standard deviation of duration in table 4. Expressed in timesteps.

1987= 1987 (Calibration land use).

FV= Future land use without on-site detention.

FRST= Pre-Developed Land Use.

SUB-BASIN	SCEN-TABLE			DISCHARGE LEVELS (CUBIC FEET PER SECOND)																		MAX	MIN	MEAN	SDEV		
	RCH	ARNO	NUM	0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800	900					1000	1100
WH8	10	FH	4 11367000	96.23	37.44	27.31	18.07	14.14	11.5	8.409	1.5	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10	FH	5 1 1E+30	116.6	32.4	23.22	14.62	12.42	9.379	4.397	0.5	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11	FH	1 1 1	0.31	0.07582	0.03697	0.00543	0.00153	0.00056	0.00003	0	0	0	0	0	0	0	0	0	0	0	0	0	162.7	0	3.085	7.952
WH5	11	FH	2 11367000	424000	103700	50550	7429	2101	769	42	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11	FH	3 1 1	1275	1664	1104	246	81	33	4	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11	FH	4 11367000	332.5	62.31	45.79	30.2	25.94	23.3	10.5	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11	FH	5 1 1E+30	369.3	50.64	34.55	22.3	20.06	16.5	8.201	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12	FH	1 1 1	0.4023	0.2204	0.1176	0.02592	0.00937	0.00407	0.00106	0.00043	0.00013	0.00001	0	0	0	0	0	0	0	0	0	0	320.8	0	7.449	15.84
12102920	12	FH	2 11367000	550100	301400	160900	35440	12820	5565	1451	597	190	27	0	0	0	0	0	0	0	0	0	0				
12102920	12	FH	3 1 1	1232	1085	1230	576	247	125	32	17	6	1	0	0	0	0	0	0	0	0	0	0				
12102920	12	FH	4 11367000	446.5	277.8	130.8	61.53	51.92	44.52	45.34	35.12	31.67	27	0	0	0	0	0	0	0	0	0	0				
12102920	12	FH	5 1 1E+30	723.9	359.4	166.2	65.19	48.29	39.66	32.68	27.01	23.7	0	0	0	0	0	0	0	0	0	0	0				
WH4	13	FH	1 1 1	0.414	0.2413	0.1345	0.03291	0.0131	0.00552	0.00153	0.00062	0.00024	0.00009	0.00001	0	0	0	0	0	0	0	0	0	360.3	0	8.388	17.73
WH4	13	FH	2 11367000	566000	330000	183900	45000	17920	7561	2098	848	337	125	20	0	0	0	0	0	0	0	0	0				
WH4	13	FH	3 1 1	1178	1171	1197	620	316	150	47	19	10	5	1	0	0	0	0	0	0	0	0	0				
WH4	13	FH	4 11367000	480.5	281.8	153.6	72.58	56.7	50.41	44.64	44.63	33.7	25	20	0	0	0	0	0	0	0	0	0				
WH4	13	FH	5 1 1E+30	762.1	376.9	189.7	72.67	53.55	41.94	34.45	31.77	28.13	24.78	0	0	0	0	0	0	0	0	0	0				
WH3	14	FH	1 1 1	0.1537	0.03746	0.01292	0.00121	0.00024	0.00003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	136	0	1.503	4.638
WH3	14	FH	2 11367000	210100	51220	17670	1666	332	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	FH	3 1 1	3364	3442	1946	263	65	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	FH	4 11367000	62.47	14.88	9.08	6.335	5.108	2.778	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14	FH	5 1 1E+30	105.8	16.52	9.81	6.346	4.008	1.812	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH2	15	FH	1 1 1	0.8272	0.3356	0.2069	0.05889	0.0258	0.01242	0.00353	0.00136	0.00062	0.00030	0.00012	0.00004	0	0	0	0	0	0	0	0	452	0	13.82	22.58
WH2	15	FH	2 11367000	1131000	458900	282900	80520	35290	16990	4839	1864	860	421	175	66	0	0	0	0	0	0	0	0				
WH2	15	FH	3 1 1	273	1388	1641	1108	642	402	144	57	26	17	7	5	0	0	0	0	0	0	0	0				
WH2	15	FH	4 11367000	4143	330.6	172.4	72.67	54.96	42.25	33.6	32.7	33.08	24.76	25	13.2	0	0	0	0	0	0	0	0				
WH2	15	FH	5 1 1E+30	9079	641.7	293.8	90.24	62.7	50	37.52	33.73	29.49	25.26	24.87	15.59	0	0	0	0	0	0	0	0				
WH1	16	FH	1 1 1	0.8634	0.3448	0.2168	0.06462	0.02879	0.01434	0.00411	0.00163	0.00074	0.00038	0.00016	0.00007	0	0	0	0	0	0	0	0	465.5	0.1192	14.58	23.72
WH1	16	FH	2 11367000	1181000	471500	296400	88360	39370	19600	5633	2235	1023	528	220	100	0	0	0	0	0	0	0	0				
WH1	16	FH	3 1 1	230	1333	1550	1096	626	403	135	59	22	16	8	3	0	0	0	0	0	0	0	0				
WH1	16	FH	4 11367000	5133	353.7	191.2	80.62	62.89	48.65	41.73	37.88	46.5	33	27.5	33.33	0	0	0	0	0	0	0	0				
WH1	16	FH	5 1 1E+30	9303	676.9	316.9	99.36	67.44	51.7	39.9	34.43	31.8	25.82	24.43	24.64	0	0	0	0	0	0	0	0				
H12	17	1987	1 1 1	0.00783	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.555	0	0.4006	0.5258
H12	17	1987	2 11367000	10710	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	1987	3 1 1	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	1987	4 11367000	510.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	1987	5 1 1E+30	355.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	1987	1 1 1	0.0342	0.00013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.78	0	0.4855	0.6734
H11	18	1987	2 11367000	46770	191	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	1987	3 1 1	523	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	1987	4 11367000	89.43	14.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	1987	5 1 1E+30	265.9	22.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	1987	1 1 1	0.08516	0.00032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.54	0	0.6427	0.6427
H10	19	1987	2 11367000	116400	448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

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TABLE C.2  
HSPF DURATION DATA

	TABLE NUM	DESCRIPTION	MODEL SCENARIO
BASIN: HYLEBOS	1	Fraction of total simulation time flows equal or exceed discharge level.	1987= 1987 (Calibration land use).
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987	2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.	FH= Future land use without on-site detention.
TIMESTEP: 15 MINUTES	3	Number of excursions at each discharge level.	FRST= Pre-Developed Land Use.
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424	4	Average duration of each excursion in table 3. Expressed in timesteps.	
NUMBER OF DAYS IN ANALYSIS: 14244	5	Standard deviation of duration in table 4. Expressed in timesteps.	

SUB-BASIN	SCEN-TABLE		DISCHARGE LEVELS (CUBIC FEET PER SECOND)																				MAX	MIN	MEAN	SDEV
	RCH	ARIO NUM	0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800	900	1000	1100				
H10	19	1987	3	1	263	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	1987	4	1367000	442.7	149.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	1987	5	1E+30	583	131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	1987	1	1	0.191	0.00937	0.00111	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60.74	0	1.225	2.175
H8	20	1987	2	1367000	261200	12820	1530	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	1987	3	1	1341	640	130	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	1987	4	1367000	194.7	20.04	11.77	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	1987	5	1E+30	502.2	42.89	25.33	1.118	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	1987	1	1	0.1291	0.0134	0.00234	0.00007	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	77.59	0	0.9035	2.41
H9	21	1987	2	1367000	176600	18330	3201	99	4	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	1987	3	1	2433	1280	324	21	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	1987	4	1367000	72.57	14.32	9.88	4.714	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	1987	5	1E+30	122.2	16.84	11.2	3.369	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	1987	1	1	0.1291	0.0134	0.00235	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52.92	0	0.9035	2.402
H KITT	29	1987	2	1367000	176600	18320	3218	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	1987	3	1	2430	1277	321	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	1987	4	1367000	72.66	14.35	10.02	9.667	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	1987	5	1E+30	122.2	16.92	11.27	2.867	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H6	22	1987	1	1	0.2769	0.04844	0.01153	0.00087	0.00022	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	115.7	0	2.182	4.573
H6	22	1987	2	1367000	378700	66240	15760	1190	311	29	0	0	0	0	0	0	0	0	0	0	0	0				
H6	22	1987	3	1	1595	1923	922	106	36	5	0	0	0	0	0	0	0	0	0	0	0	0				
H6	22	1987	4	1367000	237.4	34.45	17.1	11.23	8.639	5.8	0	0	0	0	0	0	0	0	0	0	0	0				
H6	22	1987	5	1E+30	575.2	71.54	26.75	13.29	7.952	2.561	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	1987	1	1	0.01465	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.58	0	0.2682	0.49
H7	23	1987	2	1367000	20040	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	1987	3	1	146	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	1987	4	1367000	137.3	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	1987	5	1E+30	132.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	1987	1	1	0.09678	0.00292	0.00025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32.68	0	0.6862	1.397
H5	24	1987	2	1367000	132300	4000	342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	1987	3	1	1834	185	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	1987	4	1367000	72.16	21.62	14.87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	1987	5	1E+30	143.8	35.15	19.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H4	25	1987	1	1	0.3283	0.07468	0.02153	0.00181	0.00051	0.00017	0	0	0	0	0	0	0	0	0	0	0	0	147.1	0	2.87	5.942
H4	25	1987	2	1367000	448900	102100	29440	2483	709	233	0	0	0	0	0	0	0	0	0	0	0	0				
H4	25	1987	3	1	1440	1963	1163	186	53	23	0	0	0	0	0	0	0	0	0	0	0	0				
H4	25	1987	4	1367000	311.7	52.02	25.31	13.35	13.38	10.13	0	0	0	0	0	0	0	0	0	0	0	0				
H4	25	1987	5	1E+30	843.8	104.1	47.51	20.51	13.83	8.669	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	1987	1	1	0.04763	0.00099	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.41	0	0.3964	0.9453
H2	26	1987	2	1367000	65130	1364	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	1987	3	1	878	46	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	1987	4	1367000	74.18	29.65	13.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	1987	5	1E+30	97.63	27.97	7.838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27	1987	1	1	0.07676	0.00290	0.00035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40.03	0	0.5726	1.369

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TABLE C.2  
HSPF DURATION DATA

			TABLE NUM	DESCRIPTION																	MODEL SCENARIO				
BASIN: HYLEBOS			1	Fraction of total simulation time flows equal or exceed discharge level.																	1987= 1987 (Calibration land use).				
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987			2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.																	FH= Future land use without on-site detention.				
Timestep: 15 MINUTES			3	Number of excursions at each discharge level.																	FRST= Pre-Developed Land Use.				
NUMBER OF Timesteps IN ANALYSIS: 1367424			4	Average duration of each excursion in table 3. Expressed in timesteps.																					
NUMBER OF DAYS IN ANALYSIS: 14244			5	Standard deviation of duration in table 4. Expressed in timesteps.																					
SUB-BASIN	SCEN-TABLE	RCH ARI0 NUM	DISCHARGE LEVELS (CUBIC FEET PER SECOND)																	MAX	MIN	MEAN	SDEV		
			0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800					900	1000
H3	27 1987	2	1367000	105000	3970	482	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27 1987	3	1	1423	305	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27 1987	4	1367000	73.76	13.02	8.169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27 1987	5	1E+30	108.7	23.13	13.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H1	28 1987	1	1	0.4277	0.1336	0.05346	0.00690	0.00200	0.00076	0.00020	0.00002	0	0	0	0	0	0	0	0	0	0	240.9	0.1373	4.83	9.304
H1	28 1987	2	1367000	584800	182700	73100	9446	2741	1049	284	39	0	0	0	0	0	0	0	0	0	0				
H1	28 1987	3	1	1047	1321	1243	336	112	47	19	4	0	0	0	0	0	0	0	0	0	0				
H1	28 1987	4	1367000	558.5	138.3	58.81	28.11	24.47	22.32	14.95	9.75	0	0	0	0	0	0	0	0	0	0				
H1	28 1987	5	1E+30	1499	239.7	93.99	34.66	28.17	21.08	16.88	4.603	0	0	0	0	0	0	0	0	0	0				
H1+WH1	33 1987	1	1	0.8996	0.3468	0.1909	0.05149	0.02226	0.0105	0.00289	0.00109	0.00053	0.00024	0.00013	0.00005	0	0	0	0	0	0	458.2	1.219	13.42	21.01
H1+WH1	33 1987	2	1367000	1230000	474200	261100	70410	30440	14350	3952	1501	733	337	182	74	0	0	0	0	0	0				
H1+WH1	33 1987	3	1	182	1179	1326	974	586	356	117	48	32	19	9	5	0	0	0	0	0	0				
H1+WH1	33 1987	4	1367000	6759	402.2	196.9	72.29	51.94	40.31	33.78	31.27	22.91	17.74	20.22	14.8	0	0	0	0	0	0				
H1+WH1	33 1987	5	1E+30	4659	1007	364.3	99.85	65.61	47.05	37.18	28.52	19.67	19.04	22.08	9.325	0	0	0	0	0	0				
H12	17 FH	1	1	0.05892	0.00043	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.22	0	0.7961	0.9623
H12	17 FH	2	1367000	80570	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17 FH	3	1	178	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17 FH	4	1367000	452.6	85.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17 FH	5	1E+30	404.8	82.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18 FH	1	1	0.1287	0.00223	0.00010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27.18	0.00003	0.9905	1.331
H11	18 FH	2	1367000	176000	3061	146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18 FH	3	1	2570	257	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18 FH	4	1367000	68.47	11.91	6.952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18 FH	5	1E+30	228.5	29.1	9.945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19 FH	1	1	0.2138	0.00498	0.00027	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	1.27	1.716
H10	19 FH	2	1367000	292300	6810	380	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19 FH	3	1	827	84	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19 FH	4	1367000	353.5	81.07	47.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19 FH	5	1E+30	623	91.2	52.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20 FH	1	1	0.2962	0.042	0.00900	0.00054	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	0	97.66	0	2.216	4.062
H8	20 FH	2	1367000	405100	57430	12320	752	106	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20 FH	3	1	1573	2167	852	87	19	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20 FH	4	1367000	257.5	26.5	14.46	8.644	5.579	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20 FH	5	1E+30	604.8	50.84	21.79	11	3.217	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21 FH	1	1	0.1484	0.03455	0.01117	0.00097	0.00017	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	115.1	0	1.377	4.308
H9	21 FH	2	1367000	202900	47250	15280	1327	241	27	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21 FH	3	1	2916	2598	1301	176	44	9	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21 FH	4	1367000	69.6	18.19	11.74	7.54	5.477	3	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21 FH	5	1E+30	93.54	16.71	11.27	7.32	4.181	1.333	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29 FH	1	1	0.1484	0.03457	0.01137	0.00070	0.00005	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	106.7	0	1.377	4.241
H KITT	29 FH	2	1367000	202900	47280	15550	969	81	4	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29 FH	3	1	2914	2592	1298	53	11	1	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29 FH	4	1367000	69.65	18.24	11.98	18.28	7.364	4	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29 FH	5	1E+30	93.59	16.72	11.61	14.06	4.829	0	0	0	0	0	0	0	0	0	0	0	0	0				

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TABLE C.2  
HSPE DURATION DATA

		TABLE NUM	DESCRIPTION																				MODEL SCENARIO				
BASIN: HYLEBOS			1	Fraction of total simulation time flows equal or exceed discharge level.																				1987= 1987 (Calibration land use).			
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987			2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.																				FH= Future land use without on-site detention.			
Timestep: 15 MINUTES			3	Number of excursions at each discharge level.																				FRST= Pre-Developed Land Use.			
NUMBER OF Timesteps IN ANALYSIS: 1367424			4	Average duration of each excursion in table 3. Expressed in timesteps.																							
NUMBER OF DAYS IN ANALYSIS: 14244			5	Standard deviation of duration in table 4. Expressed in timesteps.																							
SUB-BASIN		SCEN-ARIO	TABLE NUM	0	2	10	20	50	75	100	150	200	250	300	350	400	500	600	700	800	900	1000	1100	MAX	MIN	MEAN	SDEV
H6	22 FH	1	1	0.3574	0.09132	0.03916	0.00655	0.00229	0.00071	0.00007	0.00000	0	0	0	0	0	0	0	0	0	0	0	212.1	0	3.736	8.54	
H6	22 FH	2	1367000	488800	124900	53550	8958	3136	977	109	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H6	22 FH	3	1	1442	3041	2471	721	269	85	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H6	22 FH	4	1367000	338.9	41.06	21.67	12.42	11.66	11.49	8.385	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H6	22 FH	5	1E+30	746.4	69.67	28.14	12.89	13.54	12.24	4.764	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H7	23 FH	1	1	0.03022	0.00019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.57	0	0.3859	0.6898	
H7	23 FH	2	1367000	41330	266	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H7	23 FH	3	1	321	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H7	23 FH	4	1367000	128.7	44.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H7	23 FH	5	1E+30	121.7	31.83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H5	24 FH	1	1	0.1379	0.01113	0.00144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44.71	0	1.011	2.175	
H5	24 FH	2	1367000	188600	15220	1975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H5	24 FH	3	1	2606	696	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H5	24 FH	4	1367000	72.38	21.87	17.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H5	24 FH	5	1E+30	133.3	30.09	20.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H4	25 FH	1	1	0.4112	0.1228	0.05497	0.01089	0.00389	0.00172	0.00032	0.00005	0.00000	0	0	0	0	0	0	0	0	0	0	255.3	0	4.754	10.67	
H4	25 FH	2	1367000	562300	167900	75170	14890	5321	2363	445	71	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H4	25 FH	3	1	1230	2848	2597	1049	416	183	37	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H4	25 FH	4	1367000	457.2	58.94	28.95	14.19	12.79	12.91	12.03	7.1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H4	25 FH	5	1E+30	1165	106.3	44.38	16.31	13.85	15.34	13.6	5.029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H2	26 FH	1	1	0.1193	0.01479	0.00249	0.00005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61.49	0	0.9253	2.49	
H2	26 FH	2	1367000	163200	20230	3414	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H2	26 FH	3	1	2508	804	165	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H2	26 FH	4	1367000	65.06	25.16	20.69	11.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H2	26 FH	5	1E+30	70.4	22.72	18.22	9.019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H3	27 FH	1	1	0.1414	0.02435	0.00514	0.00031	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87.25	0	1.195	3.223	
H3	27 FH	2	1367000	193400	33290	7038	433	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H3	27 FH	3	1	2465	1528	523	58	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H3	27 FH	4	1367000	78.46	21.79	13.46	7.466	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H3	27 FH	5	1E+30	97.34	24.23	16.5	8.028	1.077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H1	28 FH	1	1	0.5006	0.1927	0.1024	0.03091	0.01347	0.00631	0.00225	0.00093	0.00040	0.00015	0.00004	0.00000	0	0	0	0	0	0	0	435.6	0.1333	8.019	17.81	
H1	28 FH	2	1367000	684500	263600	140000	42270	18410	8630	3082	1272	559	211	67	8	0	0	0	0	0	0	0	0	0	0	0	
H1	28 FH	3	1	891	2002	2355	1401	791	441	188	79	40	19	8	2	0	0	0	0	0	0	0	0	0	0	0	
H1	28 FH	4	1367000	768.2	131.7	59.43	30.17	23.28	19.57	16.39	16.1	13.98	11.11	8.375	4	0	0	0	0	0	0	0	0	0	0	0	
H1	28 FH	5	1E+30	1935	219.2	81.91	32.24	21.83	17.46	15.98	16.25	13.32	8.902	5.611	2	0	0	0	0	0	0	0	0	0	0	0	
H1+WH1	33 FH	1	1	0.9301	0.4169	0.2906	0.1246	0.07188	0.04477	0.01951	0.00917	0.00475	0.00275	0.00168	0.00106	0.00049	0.00020	0.00008	0	0	0	0	799.5	1.321	22.59	40.61	
H1+WH1	33 FH	2	1367000	1272000	570000	397400	170400	98290	61220	26680	12550	6507	3765	2303	1457	673	282	119	0	0	0	0	0	0	0	0	
H1+WH1	33 FH	3	1	110	1142	1433	1903	1616	1265	718	423	254	154	98	61	28	18	8	0	0	0	0	0	0	0	0	
H1+WH1	33 FH	4	1367000	11560	499.2	277.3	89.57	60.82	48.4	37.15	29.66	25.62	24.45	23.5	23.89	24.04	15.67	14.87	0	0	0	0	0	0	0	0	
H1+WH1	33 FH	5	1E+30	1156	484.1	136.5	82.94	61.84	42.67	33.04	29.76	25.81	25.71	24.69	22.81	18.71	8.724	0	0	0	0	0	0	0	0	0	

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TABLE C.2  
HSPF DURATION DATA

BASIN: HYLEBOS	TABLE NUM	DESCRIPTION	MODEL SCENARIO
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987	1	Fraction of total simulation time flows equal or exceed discharge level.	1987= 1987 (Calibration land use).
TIMESTEP: 15 MINUTES	2	Total length of time discharge levels were equal or exceeded. Expressed in timesteps.	FH= Future land use without on-site detention.
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424	3	Number of excursions at each discharge level.	FRST= Pre-Developed Land Use.
NUMBER OF DAYS IN ANALYSIS: 14244	4	Average duration of each excursion in table 3. Expressed in timesteps.	
	5	Standard deviation of duration in table 4. Expressed in timesteps.	

SUB-BASIN	SCEN-TABLE	RCH	ARIO	NUM	1	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300	MAX	MIN	MEAN	SDEV
H12	17	FRST	1	1	1	0.01173	0.00090	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.343	0	0.364	0.588
H12	17	FRST	2	1	1367000	16030	1235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	FRST	3	1	1	26	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	FRST	4	1	1367000	616.7	308.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H12	17	FRST	5	1	1E+30	358.2	166.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	FRST	1	1	1	0.04278	0.00217	0.00021	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.91	0	0.448	0.7393
H11	18	FRST	2	1	1367000	58490	2967	292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	FRST	3	1	1	224	27	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	FRST	4	1	1367000	261.1	109.9	97.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H11	18	FRST	5	1	1E+30	492.1	180.8	134.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	FRST	1	1	1	0.08852	0.00499	0.00044	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.55	0	0.578	0.9846
H10	19	FRST	2	1	1367000	121000	6830	604	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	FRST	3	1	1	180	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	FRST	4	1	1367000	672.5	341.5	302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H10	19	FRST	5	1	1E+30	763.7	253.4	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	FRST	1	1	1	0.1729	0.05196	0.00802	0.00046	0.00023	0.00013	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	41.88	0	1.045	2.031
H8	20	FRST	2	1	1367000	236400	71040	10980	638	326	187	5	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	FRST	3	1	1	340	319	103	22	7	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	FRST	4	1	1367000	695.3	222.7	106.6	29	46.57	26.71	5	0	0	0	0	0	0	0	0	0	0	0	0	0				
H8	20	FRST	5	1	1E+30	946.5	261.2	144.5	74.05	85.93	33.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	FRST	1	1	1	0.1062	0.02681	0.00400	0.00029	0.00012	0.00005	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	48.41	0	0.6444	1.576
H9	21	FRST	2	1	1367000	145200	36660	5481	399	168	81	15	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	FRST	3	1	1	454	293	114	28	16	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	FRST	4	1	1367000	319.9	125.1	48.08	14.25	10.5	9	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0				
H9	21	FRST	5	1	1E+30	325.4	143.4	70.16	32.38	15.52	6.944	1.92	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	FRST	1	1	1	0.1062	0.02681	0.00400	0.00029	0.00012	0.00005	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	44.8	0	0.6444	1.576
H KITT	29	FRST	2	1	1367000	145200	36660	5482	399	174	82	15	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	FRST	3	1	1	454	291	113	27	16	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	FRST	4	1	1367000	319.9	126	48.51	14.78	10.87	10.25	5	0	0	0	0	0	0	0	0	0	0	0	0	0				
H KITT	29	FRST	5	1	1E+30	325.4	143.6	70.35	32.9	15.64	6.851	1.633	0	0	0	0	0	0	0	0	0	0	0	0	0				
H6	22	FRST	1	1	1	0.2297	0.1148	0.04058	0.00652	0.00291	0.00146	0.00042	0.00019	0.00009	0.00003	0.00001	0	0	0	0	0	0	0	0	0	87.24	0	1.753	3.729
H6	22	FRST	2	1	1367000	314100	157000	55490	8919	3986	1998	585	272	128	51	17	0	0	0	0	0	0	0	0	0				
H6	22	FRST	3	1	1	357	414	320	117	82	47	28	14	8	6	4	0	0	0	0	0	0	0	0	0				
H6	22	FRST	4	1	1367000	879.8	379.2	173.4	76.23	48.61	42.51	20.89	19.43	16	8.5	4.25	0	0	0	0	0	0	0	0	0				
H6	22	FRST	5	1	1E+30	1185	416.9	189.9	107.1	76.87	65.72	48.91	46.85	15.82	7.112	1.299	0	0	0	0	0	0	0	0	0				
H7	23	FRST	1	1	1	0.01429	0.00039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.422	0	0.2358	0.4722
H7	23	FRST	2	1	1367000	19530	545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	FRST	3	1	1	116	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	FRST	4	1	1367000	168.4	181.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H7	23	FRST	5	1	1E+30	159.8	79.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	FRST	1	1	1	0.08175	0.01502	0.00162	0.00007	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.71	0	0.551	1.211
H5	24	FRST	2	1	1367000	111800	20540	2221	108	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	FRST	3	1	1	402	143	23	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H5	24	FRST	4	1	1367000	278.1	143.6	96.57	54	5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

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BASIN: HYLEBOS  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
Timestep: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

Fraction of total simulation time flows equal or exceed discharge level.  
Total length of time discharge levels were equaled or exceeded. Expressed in timesteps.  
Number of excursions at each discharge level.  
Average duration of each excursion in table 3. Expressed in timesteps.  
Standard deviation of duration in table 4. Expressed in timesteps.

1987= 1987 (Calibration land use).  
FH= Future land use without on-site detention.  
FRST= Pre-Developed Land Use.

SUB-BASIN	SCEN-TABLE																											
	RCH	ARTO	NUM	:	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300	MAX	MIN	MEAN	SDEV
H5	24	FRST	5	:	1E+30	306.4	147.1	86.89	39	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H4	25	FRST	1	:	1	0.2661	0.1489	0.0657	0.01541	0.00804	0.00435	0.00148	0.00055	0.00025	0.00017	0.00009	0.00004	0.00001	0	0	0	0	0	0	110.8	0	2.306	4.938
H4	25	FRST	2	:	1367000	363900	203600	89840	21080	10990	5953	2033	756	355	233	129	59	19	0	0	0	0	0	0				
H4	25	FRST	3	:	1	357	420	376	179	113	79	37	27	16	7	6	6	4	0	0	0	0	0	0				
H4	25	FRST	4	:	1367000	1019	484.8	238.9	117.7	97.3	75.35	54.95	28	22.19	33.29	21.5	9.833	4.75	0	0	0	0	0	0				
H4	25	FRST	5	:	1E+30	1497	623.6	264	148	117.6	95.41	75.77	56.72	53.92	58.49	24.77	10.32	3.112	0	0	0	0	0	0				
H2	26	FRST	1	:	1	0.04135	0.00495	0.00047	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.85	0	0.3238	0.8168
H2	26	FRST	2	:	1367000	56540	6770	655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	FRST	3	:	1	360	76	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	FRST	4	:	1367000	157	89.08	50.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H2	26	FRST	5	:	1E+30	140.3	69.69	43.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27	FRST	1	:	1	0.06721	0.0128	0.00157	0.00007	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	30.42	0	0.4529	1.146
H3	27	FRST	2	:	1367000	91900	17510	2158	108	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27	FRST	3	:	1	460	186	35	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27	FRST	4	:	1367000	199.8	94.13	61.66	18	6.333	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
H3	27	FRST	5	:	1E+30	177.3	97.21	58.97	35.36	4.989	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
H1	28	FRST	1	:	1	0.3422	0.2122	0.118	0.04518	0.02886	0.01902	0.00839	0.00404	0.00211	0.00122	0.00066	0.00040	0.00022	0.00010	0.00003	0.00000	0	0	0	176.8	0.1101	3.939	7.934
H1	28	FRST	2	:	1367000	467900	290100	161300	61780	39470	26010	11480	5527	2891	1675	906	560	304	144	44	3	0	0	0				
H1	28	FRST	3	:	1	313	369	411	321	239	176	94	53	31	22	15	11	6	5	4	1	0	0	0				
H1	28	FRST	4	:	1367000	1495	786.2	392.4	192.5	165.1	147.8	122.1	104.3	93.26	76.14	60.4	50.91	50.67	28.8	11	3	0	0	0				
H1	28	FRST	5	:	1E+30	2484	942	402.5	181.3	162.9	141.4	113.8	84.61	78.12	70.74	62.91	62.47	65.34	41.7	12.86	0	0	0	0				
H1+WH1	33	FRST	1	:	1	0.8502	0.4262	0.2718	0.1502	0.114	0.08808	0.05325	0.03373	0.02124	0.01382	0.00899	0.00633	0.00434	0.00183	0.00090	0.00041	0.00022	0.00010	0.00003	349.3	1.2	10.5	16.1
H1+WH1	33	FRST	2	:	1367000	1163000	582800	371700	205400	155900	120400	72810	46130	29050	18890	12310	8667	5935	2514	1236	566	301	137	42				
H1+WH1	33	FRST	3	:	1	87	209	343	377	395	376	322	253	174	133	91	73	55	29	18	10	6	4	3				
H1+WH1	33	FRST	4	:	1367000	13360	2788	1084	544.7	394.7	320.3	226.1	182.3	166.9	142	135.2	118.7	107.9	86.69	68.67	56.6	50.17	34.25	14				
H1+WH1	33	FRST	5	:	1E+30	5471	5043	1678	643.6	424.5	349.6	208.3	175.4	152.6	140.3	122.9	104.1	89.88	78.48	67.33	68.47	67.07	44.95	15.64				
WH7	5	FRST	1	:	1	0.0644	0.00979	0.00077	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.48	0	0.4285	1.051
WH7	5	FRST	2	:	1367000	88060	13390	1060	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FRST	3	:	1	605	68	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FRST	4	:	1367000	145.6	196.9	117.8	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH7	5	FRST	5	:	1E+30	166.6	113.4	80.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FRST	1	:	1	0.00008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.28	0	0.05387	0.125
WH9	6	FRST	2	:	1367000	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FRST	3	:	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FRST	4	:	1367000	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH9	6	FRST	5	:	1E+30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FRST	1	:	1	0.00081	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.226	0	0.09089	0.2138
WH6	7	FRST	2	:	1367000	1113	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FRST	3	:	1	53	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FRST	4	:	1367000	21	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH6	7	FRST	5	:	1E+30	46.73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FRST	1	:	1	0.04564	0.00516	0.00042	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22.63	0	0.3372	0.8404
WH10	8	FRST	2	:	1367000	62410	7057	580	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8	FRST	3	:	1	473	171	39	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

17-May-90

TABLE C.2  
HSPF DURATION DATA

BASIN: HYLEBOS  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
TIMESTEP: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

DESCRIPTION

MODEL SCENARIO

1987= 1987 (Calibration land use).

FH= Future land use without on-site detention.

FRST= Pre-Developed Land Use.

SUB-BASIN	SCEN-TABLE	RCH	ARIO	NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300	MAX	MIN	MEAN	SDEV
WH10	8 FRST	4	1367000	132	41.27	14.87	2.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH10	8 FRST	5	1E+30	154	68.87	31.62	1.299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 FRST	1	1	0.05899	0.00718	0.00051	0.00006	0.00003	0.00001	0.00000	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	54.22	0	0.3952	0.9579
WH11	9 FRST	2	1367000	80670	9831	704	83	42	15	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 FRST	3	1	464	272	76	22	12	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 FRST	4	1367000	173.9	36.14	9.263	3.773	3.5	2.143	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH11	9 FRST	5	1E+30	214.8	77.92	27.76	3.218	2.63	1.245	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 FRST	1	1	0.1488	0.05689	0.01326	0.00133	0.00053	0.00025	0.00007	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	54.87	0	0.9676	2.337
WH8	10 FRST	2	1367000	203400	77790	18130	1821	725	353	106	16	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 FRST	3	1	467	361	149	32	19	12	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 FRST	4	1367000	435.6	215.5	121.7	56.91	38.16	29.42	15.14	5.333	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH8	10 FRST	5	1E+30	488.3	201	129.1	60.75	50.56	46.72	12.17	1.247	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 FRST	1	1	0.1644	0.05271	0.01514	0.00160	0.00064	0.00026	0.00007	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	52.38	0	1.044	2.432
WH5	11 FRST	2	1367000	224800	72070	20710	2197	881	366	105	23	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 FRST	3	1	272	231	128	23	12	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 FRST	4	1367000	826.6	312	161.8	95.52	73.42	61	105	23	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH5	11 FRST	5	1E+30	737.2	240.9	142	70.81	63.77	65.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 FRST	1	1	0.2063	0.1048	0.03514	0.00701	0.00317	0.00164	0.00046	0.00018	0.00008	0.00002	0	0	0	0	0	0	0	0	0	0	0	77.88	0	1.564	3.653
12102920	12 FRST	2	1367000	282100	143200	48060	9587	4346	2250	642	254	110	41	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 FRST	3	1	361	342	237	61	36	21	10	4	1	1	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 FRST	4	1367000	781.4	418.9	202.8	157.2	120.7	107.1	64.2	63.5	110	41	0	0	0	0	0	0	0	0	0	0	0				
12102920	12 FRST	5	1E+30	861	391.3	163.4	104.9	90.46	71.75	68.47	70.59	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH4	13 FRST	1	1	0.2239	0.1281	0.04977	0.01201	0.00667	0.00352	0.00121	0.00043	0.00019	0.00009	0.00006	0.00002	0	0	0	0	0	0	0	0	0	97.56	0	1.919	4.504
WH4	13 FRST	2	1367000	306200	175200	68050	16420	9124	4818	1656	595	270	135	90	35	0	0	0	0	0	0	0	0	0				
WH4	13 FRST	3	1	346	359	276	100	63	41	19	9	4	2	1	1	0	0	0	0	0	0	0	0	0				
WH4	13 FRST	4	1367000	885	488	246.6	164.2	144.8	117.5	87.16	66.11	67.5	67.5	90	35	0	0	0	0	0	0	0	0	0				
WH4	13 FRST	5	1E+30	932.9	465.8	200	137.7	103.7	88.08	74.27	69.25	72.97	57.5	0	0	0	0	0	0	0	0	0	0	0				
WH3	14 FRST	1	1	0.08377	0.01777	0.00233	0.00023	0.00012	0.00007	0.00002	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	50.54	0	0.5338	1.35
WH3	14 FRST	2	1367000	114500	24300	3194	318	169	101	30	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14 FRST	3	1	559	427	157	37	19	17	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14 FRST	4	1367000	204.9	56.91	20.34	8.595	8.895	5.941	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH3	14 FRST	5	1E+30	240.8	98.45	41.48	16.07	10.37	4.359	2.769	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
WH2	15 FRST	1	1	0.7553	0.3451	0.1755	0.05539	0.03375	0.01987	0.00803	0.00339	0.00156	0.00083	0.00041	0.00024	0.00017	0.00007	0.00001	0	0	0	0	0	0	160.1	0	6.216	7.659
WH2	15 FRST	2	1367000	1033000	471900	240000	75740	46140	27180	10980	4646	2133	1146	569	332	239	97	22	0	0	0	0	0	0				
WH2	15 FRST	3	1	114	261	365	301	244	166	77	49	25	19	10	7	4	2	1	0	0	0	0	0	0				
WH2	15 FRST	4	1367000	9060	1808	657.5	251.6	189.1	163.7	142.6	94.82	85.32	60.32	56.9	47.43	59.75	48.5	22	0	0	0	0	0	0				
WH2	15 FRST	5	1E+30	12120	3371	931.5	257	179.7	161.1	125.7	89.65	79.27	69.54	72.03	67.79	70.47	45.5	0	0	0	0	0	0	0				
WH1	16 FRST	1	1	0.7724	0.3553	0.1854	0.06349	0.0397	0.02429	0.00992	0.00474	0.00225	0.00120	0.00068	0.00036	0.00022	0.00009	0.00002	0	0	0	0	0	0	172.3	0.05729	6.546	8.252
WH1	16 FRST	2	1367000	1056000	485900	253500	86810	54280	33210	13570	6494	3085	1649	931	493	302	124	41	0	0	0	0	0	0				
WH1	16 FRST	3	1	101	257	372	314	252	177	90	55	31	19	17	8	5	2	2	0	0	0	0	0	0				
WH1	16 FRST	4	1367000	10460	1891	681.5	276.5	215.4	187.6	150.8	118.1	99.52	86.79	54.76	61.62	60.4	62	20.5	0	0	0	0	0	0				
WH1	16 FRST	5	1E+30	11760	3592	965	295.3	186.6	171	131.9	98.37	81.35	74.9	66.37	71.82	70.55	51	16.5	0	0	0	0	0	0				

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TABLE C.3  
HSPF DURATION DATA  
DESCRIPTION

BASIN: LOWER PUGET SOUND  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
TIMESTEP: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

**MODEL SCENARIO**  
FRS1= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

SCEN-TABLE:			DISCHARGE LEVELS (CUBIC FEET PER SECOND)																									
SUB-BASIN	RCH	ARIO NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300	MAX	MIN	MEAN			
L5	10 FH	2	1367000	61030	11100	2073	187	52	9	0	0	0	0	0	0	0	0	0	0	0	0	0						
L5	10 FH	3	1	2679	1415	397	57	27	5	0	0	0	0	0	0	0	0	0	0	0	0	0						
L5	10 FH	4	1367000	22.78	7.847	5.222	3.281	1.926	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0						
PNC D LEON	1 FH	1	1	0.04047	0.00579	0.00107	0.00007	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	30.93	0	0.37			
PNC D LEON	1 FH	2	1367000	55350	7918	1466	105	22	2	0	0	0	0	0	0	0	0	0	0	0	0	0						
PNC D LEON	1 FH	3	1	1248	446	116	23	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0						
PNC D LEON	1 FH	4	1367000	44.35	17.75	12.64	4.565	2.444	2	0	0	0	0	0	0	0	0	0	0	0	0	0						
L4	2 FH	1	1	0.07979	0.01586	0.00324	0.00037	0.00014	0.00005	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	43.11	0.1462	0.7014			
L4	2 FH	2	1367000	109100	21690	4434	508	199	75	4	0	0	0	0	0	0	0	0	0	0	0	0						
L4	2 FH	3	1	2344	1110	374	72	32	16	2	0	0	0	0	0	0	0	0	0	0	0	0						
L4	2 FH	4	1367000	46.55	19.54	11.86	7.056	6.219	4.687	2	0	0	0	0	0	0	0	0	0	0	0	0						
M1	7 FH	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.906	0	0.07349			
M1	7 FH	2	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
M1	7 FH	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
M1	7 FH	4	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
M3	8 FH	1	1	0.02021	0.00410	0.00046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19.94	0	0.1145			
M3	8 FH	2	1367000	27630	5618	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
M3	8 FH	3	1	202	77	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
M3	8 FH	4	1367000	136.8	72.96	53.17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
L7	9 FH	1	1	0.08409	0.02891	0.00751	0.00101	0.00045	0.00021	0.00004	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	63.27	0	0.6007			
L7	9 FH	2	1367000	115000	39530	10280	1393	620	292	68	7	2	0	0	0	0	0	0	0	0	0	0						
L7	9 FH	3	1	3131	2481	1114	240	132	61	26	5	1	0	0	0	0	0	0	0	0	0	0						
L7	9 FH	4	1367000	36.73	15.93	9.226	5.804	4.697	4.787	2.615	1.4	2	0	0	0	0	0	0	0	0	0	0						
L6	3 FH	1	1	0.1322	0.03883	0.00817	0.00001	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	32.99	0	0.9984			
L6	3 FH	2	1367000	180800	53100	11180	24	16	8	0	0	0	0	0	0	0	0	0	0	0	0	0						
L6	3 FH	3	1	472	299	46	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0						
L6	3 FH	4	1367000	383	177.6	243	24	16	8	0	0	0	0	0	0	0	0	0	0	0	0	0						
L3	4 FH	1	1	0.2237	0.07137	0.02604	0.00160	0.00069	0.00028	0.00004	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	62.55	0.2841	1.747			
L3	4 FH	2	1367000	305900	97590	35600	2192	948	394	63	4	2	0	0	0	0	0	0	0	0	0	0						
L3	4 FH	3	1	2390	2417	1461	376	195	100	33	3	1	0	0	0	0	0	0	0	0	0	0						
L3	4 FH	4	1367000	128	40.38	24.37	5.83	4.862	3.94	1.909	1.333	2	0	0	0	0	0	0	0	0	0	0						
L2	5 FH	1	1	0.4979	0.1578	0.05692	0.01029	0.00511	0.00284	0.00110	0.00047	0.00019	0.00007	0.00002	0.00000	0.00000	0	0	0	0	0	0	116.6	1.128	3.442			
L2	5 FH	2	1367000	680300	215700	77840	14070	6988	3890	1516	647	273	109	38	12	3	0	0	0	0	0	0						
L2	5 FH	3	1	1064	2619	2301	1186	777	478	224	113	59	29	16	5	2	0	0	0	0	0	0						
L2	5 FH	4	1367000	639.9	82.37	33.83	11.86	8.994	8.138	6.768	5.726	4.627	3.759	2.375	2.4	1.5	0	0	0	0	0	0						
L1	6 FH	1	1	0.563	0.1683	0.0622	0.01216	0.00623	0.00350	0.00141	0.00062	0.00027	0.00011	0.00004	0.00001	0.00000	0	0	0	0	0	0	121.1	1.247	3.671			
L1	6 FH	2	1367000	769900	230100	85050	16620	8530	4790	1932	860	371	160	64	23	8	0	0	0	0	0	0						
L1	6 FH	3	1	823	2532	2321	1254	859	548	259	135	67	42	17	7	4	0	0	0	0	0	0						
L1	6 FH	4	1367000	935.5	90.88	36.64	13.26	9.93	8.741	7.459	6.37	5.537	3.81	3.765	3.286	2	0	0	0	0	0	0						
L5	10 1987	1	1	0.04428	0.00771	0.00146	0.00013	0.00003	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	40.19	0	0.3669			
L5	10 1987	2	1367000	60550	10540	1996	190	52	10	1	0	0	0	0	0	0	0	0	0	0	0	0						
L5	10 1987	3	1	2611	1355	381	58	26	5	1	0	0	0	0	0	0	0	0	0	0	0	0						
L5	10 1987	4	1367000	23.19	7.782	5.239	3.276	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0						
PNC D LEON	1 1987	1	1	0.04017	0.00557	0.00104	0.00007	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	31.11	0	0.3706			



BASIN: LOWER PUGET SOUND  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
Timestep: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

E NUM	DESCRIPTION
1	Fraction of total simulation time flows equal or exceed discharge level.
2	Total length of time discharge levels were equaled or exceeded. Expressed in timesteps.
3	Number of excursions at each discharge level.
4	Average duration of each excursion in table 3. Expressed in timesteps.

FRST= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

SUB-BASIN	SCEN-TABLE:				DISCHARGE LEVELS (CUBIC FEET PER SECOND)																				MAX	MIN	MEAN
	RCH	ARIO	NUM		0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300			
J6	3	1987	2	11367000	24080	2636	370	12	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	1987	3	1	1581	386	86	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	1987	4	11367000	15.23	6.829	4.302	4	2.5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	1987	1	1	0.4675	0.08739	0.00586	0.00009	0.00006	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.34	0.00291	2.471
J2	4	1987	2	11367000	639200	119500	8024	134	88	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	1987	3	1	507	426	83	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	1987	4	11367000	1261	280.5	96.67	44.67	44	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	1987	1	1	0.4895	0.114	0.00939	0.00027	0.00008	0.00005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38.15	0.05541	2.633
J3	5	1987	2	11367000	669400	155800	12840	374	116	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	1987	3	1	912	1130	349	34	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	1987	4	11367000	734	137.9	36.79	11	11.6	37.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J5	6	1987	1	1	0.1218	0.03425	0.00891	0.00192	0.00113	0.00072	0.00029	0.00012	0.00004	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	0	98.47	0	0.8394
J5	6	1987	2	11367000	166500	46840	12190	2629	1549	997	404	166	61	15	3	1	0	0	0	0	0	0	0	0			
J5	6	1987	3	1	3231	2639	1445	443	275	184	96	49	25	7	1	1	0	0	0	0	0	0	0	0			
J5	6	1987	4	11367000	51.55	17.75	8.433	5.935	5.633	5.418	4.208	3.388	2.44	2.143	3	1	0	0	0	0	0	0	0	0			
J4	7	1987	1	1	0.1275	0.03762	0.01014	0.00215	0.00124	0.00080	0.00033	0.00014	0.00005	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	0	99.67	0	0.881
J4	7	1987	2	11367000	174400	51440	13870	2944	1707	1096	462	195	76	19	4	1	0	0	0	0	0	0	0	0			
J4	7	1987	3	1	3071	2530	1466	454	291	190	94	52	22	7	2	1	0	0	0	0	0	0	0	0			
J4	7	1987	4	11367000	56.79	20.33	9.458	6.485	5.866	5.768	4.915	3.75	3.455	2.714	2	1	0	0	0	0	0	0	0	0			
J1	8	1987	1	1	0.7087	0.3228	0.1074	0.01987	0.01068	0.0062	0.00254	0.00130	0.00074	0.00044	0.00025	0.00015	0.00008	0.00001	0.00000	0	0	0	0	0	169.6	0.5237	4.952
J1	8	1987	2	11367000	969100	441400	146900	27170	14610	8478	3474	1785	1025	609	352	215	113	17	2	0	0	0	0	0			
J1	8	1987	3	1	584	1771	2370	1581	1140	777	389	229	144	85	61	51	26	5	1	0	0	0	0	0			
J1	8	1987	4	11367000	1659	249.3	61.98	17.19	12.81	10.91	8.931	7.795	7.118	7.165	5.77	4.216	4.346	3.4	2	0	0	0	0	0			
J8	1	FH	1	1	0.03936	0.01298	0.00285	0.00028	0.00010	0.00003	0.00000	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	61.6	0	0.3258
J8	1	FH	2	11367000	53830	17750	3903	390	144	54	6	3	1	0	0	0	0	0	0	0	0	0	0	0			
J8	1	FH	3	1	3329	2253	782	121	54	28	3	2	1	0	0	0	0	0	0	0	0	0	0	0			
J8	1	FH	4	11367000	16.17	7.881	4.991	3.223	2.667	1.929	2	1.5	1	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FH	1	1	0.00347	0.00007	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.22	0	0.06505
J7	2	FH	2	11367000	4748	101	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FH	3	1	751	39	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FH	4	11367000	6.322	2.59	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	FH	1	1	0.07348	0.03057	0.01074	0.00194	0.00094	0.00046	0.00012	0.00003	0.00000	0.00000	0.00000	0.00000	0	0	0	0	0	0	0	0	96.59	0	0.5954
J6	3	FH	2	11367000	100500	41800	14680	2664	1288	636	173	46	13	5	3	1	0	0	0	0	0	0	0	0			
J6	3	FH	3	1	3692	3188	1815	490	266	159	52	22	6	3	2	1	0	0	0	0	0	0	0	0			
J6	3	FH	4	11367000	27.22	13.11	8.088	5.437	4.842	4	3.327	2.091	2.167	1.667	1.5	1	0	0	0	0	0	0	0	0			
J2	4	FH	1	1	0.503	0.1277	0.02453	0.00131	0.00079	0.00052	0.00019	0.00003	0	0	0	0	0	0	0	0	0	0	0	0	56.62	0.00286	2.857
J2	4	FH	2	11367000	687800	174600	33550	1798	1088	724	270	43	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	FH	3	1	626	909	453	53	34	24	18	4	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	FH	4	11367000	1099	192.1	74.05	33.92	32	30.17	15	10.75	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FH	1	1	0.5197	0.1515	0.03022	0.00212	0.00096	0.00062	0.00027	0.00009	0.00000	0	0	0	0	0	0	0	0	0	0	0	60.98	0.05666	3.02
J3	5	FH	2	11367000	710700	207200	41320	2903	1318	857	376	125	5	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FH	3	1	664	1174	589	101	42	28	19	7	3	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FH	4	11367000	1070	176.5	70.15	28.74	31.38	30.61	19.79	17.86	1.667	0	0	0	0	0	0	0	0	0	0	0			
J5	6	FH	1	1	0.1352	0.04642	0.01489	0.00325	0.00189	0.00117	0.00052	0.00023	0.00010	0.00003	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	106.7	0	0.9852

TABLE C.3  
HSPF DURATION DATA

TABLE NUM

Fraction of total simulation time flows equal or exceed discharge level.  
Total length of time discharge levels were equal or exceeded. Expressed in timesteps.  
Number of excursions at each discharge level.  
Average duration of each excursion in table 3. Expressed in timesteps.

### MODEL SCENARIO

FRST= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

[illegible]

C-18



BASIN: LOWER PUGET SOUND  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
TIMESTEP: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE XIII

- 1 Fraction of total simulation time flows equal or exceed discharge level.
- 2 Total length of time discharge levels were equal or exceeded. Expressed in timesteps.
- 3 Number of excursions at each discharge level.
- 4 Average duration of each excursion in table 3. Expressed in timesteps.

FRST= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

SUB-BASIN	SCEN-TABLE:				DISCHARGE LEVELS (CUBIC FEET PER SECOND)																				MAX	MIN	MEAN	
	RCH	ARTIO	NUM	:	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300				
R1	3	1987	2	:	1367000	147300	39470	7838	1587	836	459	143	45	15	3	2	0	0	0	0	0	0	0	0	0			
R1	3	1987	3	:	1	3628	2618	1262	444	270	175	77	31	11	3	2	0	0	0	0	0	0	0	0	0			
R1	3	1987	4	:	1367000	40.61	15.08	6.211	3.574	3.096	2.623	1.857	1.452	1.364	1	1	0	0	0	0	0	0	0	0	0			
R3	1	FH	1	:	1	0.08419	0.00734	0.00029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19.66	0.3195	0.7591
R3	1	FH	2	:	1367000	115100	10040	408	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R3	1	FH	3	:	1	191	57	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R3	1	FH	4	:	1367000	602.8	176.1	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FH	1	:	1	0.1331	0.02333	0.00238	0.00016	0.00005	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37.84	0.3195	1.004
R2	2	FH	2	:	1367000	182000	31900	3260	228	70	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FH	3	:	1	3410	2075	576	74	30	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FH	4	:	1367000	53.38	15.37	5.66	3.081	2.333	1.273	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R1	3	FH	1	:	1	0.1858	0.06315	0.01697	0.00356	0.00187	0.00111	0.00041	0.00015	0.00005	0.00002	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	109.4	0.3195	1.47
R1	3	FH	2	:	1367000	254100	86350	23200	4876	2565	1524	563	214	79	30	17	7	3	0	0	0	0	0	0	0			
R1	3	FH	3	:	1	3137	3308	2385	1208	719	485	216	112	51	22	12	6	3	0	0	0	0	0	0	0			
R1	3	FH	4	:	1367000	80.99	26.1	9.728	4.036	3.567	3.142	2.606	1.911	1.549	1.364	1.417	1.167	1	0	0	0	0	0	0	0			
W2	1	1987	1	:	1	0.03888	0.00577	0.00128	0.00015	0.00005	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	43.87	0.0391	0.4368
W2	1	1987	2	:	1367000	53160	7895	1755	217	72	17	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	1987	3	:	1	3503	1457	440	87	38	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	1987	4	:	1367000	15.18	5.419	3.989	2.494	1.895	1.545	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
W1	2	1987	1	:	1	0.1118	0.02648	0.00595	0.00119	0.00067	0.00037	0.00011	0.00003	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	79.93	0.08605	0.8994
W1	2	1987	2	:	1367000	152800	36210	8146	1638	926	510	161	49	6	3	0	0	0	0	0	0	0	0	0	0			
W1	2	1987	3	:	1	3341	2510	1274	359	217	140	55	28	4	2	0	0	0	0	0	0	0	0	0	0			
W1	2	1987	4	:	1367000	45.74	14.43	6.394	4.563	4.267	3.643	2.927	1.75	1.5	1.5	0	0	0	0	0	0	0	0	0	0			
W2	1	FH	1	:	1	0.05249	0.01332	0.00304	0.00042	0.00018	0.00007	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	52.33	0.02752	0.4805
W2	1	FH	2	:	1367000	71780	18210	4167	581	253	98	14	2	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	FH	3	:	1	4523	2654	1011	187	105	48	11	1	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	FH	4	:	1367000	15.87	6.862	4.122	3.107	2.41	2.042	1.273	2	0	0	0	0	0	0	0	0	0	0	0	0			
W1	2	FH	1	:	1	0.1161	0.03953	0.01284	0.00281	0.00159	0.00098	0.00038	0.00015	0.00006	0.00001	0.00000	0.00000	0.00000	0	0	0	0	0	0	0	102.1	0.06468	0.9908
W1	2	FH	2	:	1367000	158700	54050	17560	3852	2176	1344	527	214	84	26	9	4	1	0	0	0	0	0	0	0			
W1	2	FH	3	:	1	3859	3583	2347	838	505	335	161	80	40	17	7	2	1	0	0	0	0	0	0	0			
W1	2	FH	4	:	1367000	41.13	15.08	7.481	4.597	4.309	4.012	3.273	2.675	2.1	1.529	1.286	2	1	0	0	0	0	0	0	0			
S9	1	1987	1	:	1	0.1323	0.0405	0.00943	0.00126	0.00058	0.00029	0.00003	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	52.01	0.1017	1.059
S9	1	1987	2	:	1367000	180900	55380	12890	1732	800	405	52	2	0	0	0	0	0	0	0	0	0	0	0	0			
S9	1	1987	3	:	1	3057	2205	906	175	85	52	12	1	0	0	0	0	0	0	0	0	0	0	0	0			
S9	1	1987	4	:	1367000	59.18	25.11	14.23	9.897	9.412	7.788	4.333	2	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	1987	1	:	1	0.352	0.08943	0.02667	0.00331	0.00143	0.00073	0.00018	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	50.41	0.00220	2.258
S8	2	1987	2	:	1367000	481400	122300	36470	4531	1958	1004	250	12	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	1987	3	:	1	525	462	282	57	26	14	6	1	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	1987	4	:	1367000	916.9	264.7	129.3	79.49	75.31	71.71	41.67	12	0	0	0	0	0	0	0	0	0	0	0	0			
S3	3	1987	1	:	1	0.4059	0.1504	0.04306	0.00722	0.00337	0.00175	0.00059	0.00018	0.00003	0.00000	0	0	0	0	0	0	0	0	0	0	70.38	0.07587	2.767
S3	3	1987	2	:	1367000	555100	205700	58880	9873	4614	2396	809	248	52	2	0	0	0	0	0	0	0	0	0	0			
S3	3	1987	3	:	1	1164	2102	1206	356	206	118	49	25	8	1	0	0	0	0	0	0	0	0	0	0			
S3	3	1987	4	:	1367000	476.9	97.84	48.82	27.73	22.4	20.31	16.51	9.92	6.5	2	0	0	0	0	0	0	0	0	0	0			
S6	5	1987	1	:	1	0.01195	0.00078	0.00002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.18	0.02178	0.3045

17-May-90

TABLE C.3  
HSPF DURATION DATA

BASIN: LOWER PUGET SOUND	TABLE NUM	DESCRIPTION	MODEL SCENARIO
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987	1	Fraction of total simulation time flows equal or exceed discharge level.	FRST= Pre-developed land use (forested)
TIMESTEP: 15 MINUTES	2	Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.	1987= 1987 (Calibration land use).
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424	3	Number of excursions at each discharge level.	FH= Future land use without on-site det
NUMBER OF DAYS IN ANALYSIS: 14244	4	Average duration of each excursion in table 3. Expressed in timesteps.	

SUB-BASIN	SCEN-TABLE			DISCHARGE LEVELS (CUBIC FEET PER SECOND)																				MAX	MIN	MEAN
	RCH	ARIO	NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300			
S6	5	1987	2	1367000	16340	1075	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S6	5	1987	3	1	255	27	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S6	5	1987	4	1367000	64.09	39.81	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S5	6	1987	1	1	0.1072	0.01867	0.00325	0.00057	0.00028	0.00013	0.00002	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	62.71	0.0664	0.8205
S5	6	1987	2	1367000	146600	25530	4456	783	392	181	32	3	1	0	0	0	0	0	0	0	0	0	0			
S5	6	1987	3	1	2626	2180	831	195	114	65	19	2	1	0	0	0	0	0	0	0	0	0	0			
S5	6	1987	4	1367000	55.83	11.71	5.362	4.015	3.439	2.785	1.684	1.5	1	0	0	0	0	0	0	0	0	0	0			
S7 CLSD DP	4	1987	1	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
S7 CLSD DP	4	1987	2	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
S7 CLSD DP	4	1987	3	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
S7 CLSD DP	4	1987	4	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
S4	7	1987	1	1	0.1397	0.0312	0.00593	0.00108	0.00062	0.00034	0.00010	0.00002	0.00000	0.00000	0	0	0	0	0	0	0	0	0	78.69	0.08492	1.012
S4	7	1987	2	1367000	191100	42660	8114	1486	855	473	149	41	5	3	0	0	0	0	0	0	0	0	0			
S4	7	1987	3	1	2603	2715	1236	338	208	133	57	23	3	2	0	0	0	0	0	0	0	0	0			
S4	7	1987	4	1367000	73.4	15.71	6.565	4.396	4.111	3.556	2.614	1.783	1.667	1.5	0	0	0	0	0	0	0	0	0			
S2	8	1987	1	1	0.5027	0.2541	0.1023	0.02902	0.01703	0.01044	0.00433	0.00217	0.00122	0.00071	0.00042	0.00026	0.00017	0.00003	0.00000	0	0	0	0	174.7	0.2999	4.308
S2	8	1987	2	1367000	687400	347500	139800	39680	23280	14280	5923	2977	1681	978	583	361	236	48	4	0	0	0	0			
S2	8	1987	3	1	1008	1797	2394	1560	1258	987	563	344	209	153	102	69	53	20	3	0	0	0	0			
S2	8	1987	4	1367000	681.9	193.4	58.41	25.44	18.51	14.47	10.52	8.654	8.043	6.392	5.716	5.232	4.453	2.4	1.333	0	0	0	0			
S1	9	1987	1	1	0.5082	0.2574	0.1047	0.03028	0.01782	0.011	0.00460	0.00232	0.00129	0.00075	0.00045	0.00028	0.00018	0.00004	0.00000	0.00000	0	0	0	179.7	0.3128	4.382
S1	9	1987	2	1367000	695000	352000	143200	41400	24370	15040	6297	3174	1772	1037	621	385	251	56	4	1	0	0	0			
S1	9	1987	3	1	968	1766	2328	1504	1235	964	560	343	205	147	99	66	56	24	3	1	0	0	0			
S1	9	1987	4	1367000	717.9	199.3	61.5	27.53	19.73	15.6	11.24	9.254	8.644	7.054	6.273	5.833	4.482	2.333	1.333	1	0	0	0			
S9	1 FH	1	1	1	0.132	0.05524	0.02058	0.00414	0.00215	0.00120	0.00039	0.00011	0.00004	0.00000	0	0	0	0	0	0	0	0	0	78.45	0.07431	1.183
S9	1 FH	2	1367000	180600	75540	28140	5674	2948	1647	537	157	64	12	0	0	0	0	0	0	0	0	0	0			
S9	1 FH	3	1	1	3483	3036	1813	529	312	193	68	30	16	5	0	0	0	0	0	0	0	0	0			
S9	1 FH	4	1367000	51.84	24.88	15.52	10.73	9.449	8.534	7.897	5.233	4	2.4	0	0	0	0	0	0	0	0	0	0			
S8	2 FH	1	1	1	0.3705	0.1067	0.0394	0.00670	0.00318	0.00161	0.00063	0.00005	0	0	0	0	0	0	0	0	0	0	0	58.35	0.00214	2.48
S8	2 FH	2	1367000	506600	145800	53880	9174	4354	2210	869	79	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2 FH	3	1	1	675	670	498	132	70	37	15	1	0	0	0	0	0	0	0	0	0	0	0			
S8	2 FH	4	1367000	750.5	217.7	108.2	69.5	62.2	59.73	57.93	79	0	0	0	0	0	0	0	0	0	0	0	0			
S3	3 FH	1	1	1	0.4103	0.1679	0.06079	0.01448	0.00758	0.00421	0.00158	0.00064	0.00025	0.00008	0.00001	0.00000	0	0	0	0	0	0	0	92.27	0.05461	3.052
S3	3 FH	2	1367000	561000	229500	83120	19810	10370	5757	2170	883	346	111	17	1	0	0	0	0	0	0	0	0			
S3	3 FH	3	1	1	1217	2656	2101	845	577	354	147	82	40	27	7	1	0	0	0	0	0	0	0			
S3	3 FH	4	1367000	461	86.42	39.56	23.44	17.98	16.26	14.76	10.77	8.65	4.111	2.429	1	0	0	0	0	0	0	0	0			
S6	5 FH	1	1	1	0.02101	0.00160	0.00012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.14	0.01565	0.3335
S6	5 FH	2	1367000	28720	2190	174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S6	5 FH	3	1	1	458	63	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S6	5 FH	4	1367000	62.71	34.76	19.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S5	6 FH	1	1	1	0.1178	0.02821	0.00595	0.00109	0.00060	0.00033	0.00009	0.00002	0.00000	0.00000	0	0	0	0	0	0	0	0	0	72.7	0.05303	0.8857
S5	6 FH	2	1367000	161100	38570	8147	1500	827	453	131	30	6	1	0	0	0	0	0	0	0	0	0	0			
S5	6 FH	3	1	1	3117	2981	1355	343	211	130	56	18	4	1	0	0	0	0	0	0	0	0	0			
S5	6 FH	4	1367000	51.69	12.94	6.013	4.373	3.919	3.485	2.339	1.667	1.5	1	0	0	0	0	0	0	0	0	0	0			
S7	4 FH	1	1	1	0.05965	0.02471	0.00980	0.00336	0.00026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.35	0	0.7634

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TABLE C.3  
HSPF DURATION DATA

BASIN: LOWER PUGET SOUND  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
TIMESTEP: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

DESCRIPTION

MODEL SCENARIO

FRST= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

SUB-BASIN	SCEN-TABLE:			DISCHARGE LEVELS (CUBIC FEET PER SECOND)																			MAX	MIN	MEAN	
	RCH	ARIO	NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250				300
S7	4 FH	2	1367000	81570	33790	13410	4601	367	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S7	4 FH	3	1	2008	1918	1143	359	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S7	4 FH	4	1367000	40.62	17.62	11.73	12.82	22.94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S4	7 FH	1	1	0.2236	0.07781	0.03011	0.00952	0.00642	0.00467	0.00196	0.00082	0.00037	0.00016	0.00005	0.00001	0.00000	0	0	0	0	0	0	0	119	0.06911	1.859
S4	7 FH	2	1367000	305800	106400	41170	13030	8790	6390	2690	1124	510	221	77	24	6	0	0	0	0	0	0	0			
S4	7 FH	3	1	2267	3225	2526	1249	936	698	467	235	127	68	38	14	5	0	0	0	0	0	0	0			
S4	7 FH	4	1367000	134.9	32.99	16.3	10.43	9.391	9.155	5.76	4.783	4.016	3.25	2.026	1.714	1.2	0	0	0	0	0	0	0			
S2	8 FH	1	1	0.5454	0.2976	0.1326	0.05253	0.03628	0.02572	0.014	0.00825	0.00521	0.00344	0.00231	0.00157	0.00106	0.00041	0.00018	0.00005	0.00000	0	0	0	236.1	0.2625	5.449
S2	8 FH	2	1367000	745800	407000	181400	71830	49610	35160	19140	11290	7137	4716	3165	2157	1450	569	247	71	10	0	0	0			
S2	8 FH	3	1	808	1726	2736	2369	2123	1882	1307	967	688	518	384	279	204	99	60	30	8	0	0	0			
S2	8 FH	4	1367000	923	235.8	66.29	30.32	23.37	18.68	14.64	11.67	10.37	9.104	8.242	7.731	7.108	5.747	4.117	2.367	1.25	0	0	0			
S1	9 FH	1	1	0.5495	0.3009	0.1348	0.05396	0.03714	0.02643	0.01444	0.00850	0.00539	0.00355	0.00238	0.00164	0.00110	0.00043	0.00019	0.00005	0.00001	0	0	0	243	0.2745	5.527
S1	9 FH	2	1367000	751500	411400	184300	73780	50790	36140	19750	11630	7383	4856	3255	2244	1512	597	262	82	14	0	0	0			
S1	9 FH	3	1	779	1699	2715	2324	2080	1841	1282	958	703	513	390	280	208	103	60	28	8	0	0	0			
S1	9 FH	4	1367000	964.6	242.2	67.88	31.75	24.42	19.63	15.4	12.14	10.5	9.466	8.346	8.014	7.269	5.796	4.367	2.929	1.75	0	0	0			
L5	10 FRST	1	1	0.00964	0.00040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.985	0	0.1674
L5	10 FRST	2	1367000	13180	556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L5	10 FRST	3	1	110	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L5	10 FRST	4	1367000	119.8	34.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PNC D LEON	1 FRST	1	1	0.00964	0.00040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.985	0	0.1674
PNC D LEON	1 FRST	2	1367000	13180	556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PNC D LEON	1 FRST	3	1	110	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PNC D LEON	1 FRST	4	1367000	119.8	34.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L4	2 FRST	1	1	0.01867	0.00074	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.01	0.2096	0.4577
L4	2 FRST	2	1367000	25540	1016	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L4	2 FRST	3	1	184	18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L4	2 FRST	4	1367000	138.8	56.44	4.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M1	7 FRST	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.122	0	0.03891
M1	7 FRST	2	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M1	7 FRST	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M1	7 FRST	4	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M3	8 FRST	1	1	0.00170	0.00032	0.00007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.53	0	0.00943
M3	8 FRST	2	1367000	2331	441	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M3	8 FRST	3	1	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
M3	8 FRST	4	1367000	259	220.5	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L7	9 FRST	1	1	0.01793	0.00225	0.00030	0.00003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.15	0	0.1984
L7	9 FRST	2	1367000	24510	3080	414	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L7	9 FRST	3	1	301	67	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L7	9 FRST	4	1367000	81.44	45.97	41.4	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L6	3 FRST	1	1	0.0214	0.00238	0.00044	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.79	0	0.2966
L6	3 FRST	2	1367000	29270	3259	615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L6	3 FRST	3	1	86	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L6	3 FRST	4	1367000	340.3	232.8	307.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L3	4 FRST	1	1	0.07475	0.00493	0.00097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.09	0.3774	0.8856

17-May-90

TABLE C.3  
HSPF DURATION DATA  
DESCRIPTION

BASIN: LOWER PUGET SOUND  
SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
Timestep: 15 MINUTES  
NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

Fraction of total simulation time flows equal or exceed discharge level.  
Total length of time discharge levels were equalled or exceeded. Expressed in timesteps.  
Number of excursions at each discharge level.  
Average duration of each excursion in table 3. Expressed in timesteps.

## MODEL SCENARIO

FRST= Pre-developed land use (forested)  
1987= 1987 (Calibration land use).  
FH= Future land use without on-site det

SUB-BASIN	SCEN-TABLE:			DISCHARGE LEVELS (CUBIC FEET PER SECOND)																			MAX	MIN	MEAN	
	RCH	ARIO	NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250				300
L3	4	FRST	2	1367000	102200	6746	1329	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L3	4	FRST	3	1	275	55	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L3	4	FRST	4	1367000	371.7	122.7	110.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L2	5	FRST	1	1	0.3778	0.03992	0.00358	0.00023	0.00004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.09	1.323	2.317
L2	5	FRST	2	1367000	516600	54590	4906	323	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L2	5	FRST	3	1	325	232	35	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L2	5	FRST	4	1367000	1590	235.3	140.2	64.6	13.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L1	6	FRST	1	1	0.6032	0.04734	0.00396	0.00026	0.00006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.94	1.469	2.526
L1	6	FRST	2	1367000	824900	64730	5419	363	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L1	6	FRST	3	1	233	247	34	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
L1	6	FRST	4	1367000	3540	262.1	159.4	60.5	14.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J8	1	FRST	1	1	0.00008	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.211	0	0.04932
J8	1	FRST	2	1367000	120	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J8	1	FRST	3	1	18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J8	1	FRST	4	1367000	6.667	2.667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FRST	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2933	0	0.00025
J7	2	FRST	2	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FRST	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J7	2	FRST	4	1367000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	FRST	1	1	0.00227	0.00097	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.16	0	0.1028
J6	3	FRST	2	1367000	3108	96	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	FRST	3	1	79	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J6	3	FRST	4	1367000	39.34	7.385	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	FRST	1	1	0.4057	0.06031	0.00190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.01	0.00285	2.166
J2	4	FRST	2	1367000	554700	82470	2602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	FRST	3	1	128	132	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J2	4	FRST	4	1367000	4334	624.8	236.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FRST	1	1	0.4265	0.079	0.00294	0.00001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.17	0.05899	2.289
J3	5	FRST	2	1367000	583200	108000	4032	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FRST	3	1	142	163	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J3	5	FRST	4	1367000	4107	662.7	268.8	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
J5	6	FRST	1	1	0.06909	0.01025	0.00094	0.00008	0.00003	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	50.02	0	0.442
J5	6	FRST	2	1367000	94470	14020	1287	114	50	21	3	1	0	0	0	0	0	0	0	0	0	0	0			
J5	6	FRST	3	1	558	277	104	28	10	5	1	1	0	0	0	0	0	0	0	0	0	0	0			
J5	6	FRST	4	1367000	169.3	50.62	12.37	4.071	5	4.2	3	1	0	0	0	0	0	0	0	0	0	0	0			
J4	7	FRST	1	1	0.07196	0.01143	0.00115	0.00009	0.00003	0.00001	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	48.11	0	0.4562
J4	7	FRST	2	1367000	98390	15640	1575	128	54	20	2	0	0	0	0	0	0	0	0	0	0	0	0			
J4	7	FRST	3	1	515	245	99	25	11	5	1	0	0	0	0	0	0	0	0	0	0	0	0			
J4	7	FRST	4	1367000	191.1	63.82	15.91	5.12	4.909	4	2	0	0	0	0	0	0	0	0	0	0	0	0			
J1	8	FRST	1	1	0.6614	0.2769	0.07147	0.00442	0.00136	0.00050	0.00016	0.00003	0.00000	0	0	0	0	0	0	0	0	0	0	62.3	0.5762	4.143
J1	8	FRST	2	1367000	904400	378600	97730	6045	1862	686	229	49	2	0	0	0	0	0	0	0	0	0	0			
J1	8	FRST	3	1	172	283	300	82	45	28	9	6	1	0	0	0	0	0	0	0	0	0	0			
J1	8	FRST	4	1367000	5258	1338	325.8	73.72	41.38	24.5	25.44	8.167	2	0	0	0	0	0	0	0	0	0	0			
R6	4	FRST	1	1	0.00036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	0	0.07095

17-May-90

BASIN: LOWER PUGET SOUND  
 SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987  
 TIMESTEP: 15 MINUTES  
 NUMBER OF TIMESTEPS IN ANALYSIS: 1367424  
 NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

TABLE C.3  
 HSPF DURATION DATA  
 DESCRIPTION

1 Fraction of total simulation time flows equal or exceed discharge level.  
 2 Total length of time discharge levels were equal or exceeded. Expressed in timesteps.  
 3 Number of excursions at each discharge level.  
 4 Average duration of each excursion in table 3. Expressed in timesteps.

MODEL SCENARIO

FRST= Pre-developed land use (forested)  
 1987= 1987 (Calibration land use).  
 FH= Future land use without on-site det

SCEN-TABLE:				DISCHARGE LEVELS (CUBIC FEET PER SECOND)																				MAX	MIN	MEAN
SUB-BASIN	RCH	ARIO	NUM	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300			
R6	4	FRST	2	1367000	505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R6	4	FRST	3	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R6	4	FRST	4	1367000	42.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R5	5	FRST	1	1	0.00636	0.00017	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.95	0	0.1519
R5	5	FRST	2	1367000	8707	246	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R5	5	FRST	3	1	178	33	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R5	5	FRST	4	1367000	48.92	7.455	1.333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R4	6	FRST	1	1	0.07294	0.00495	0.00027	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.17	0.4981	0.9609
R4	6	FRST	2	1367000	99740	6770	379	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R4	6	FRST	3	1	496	118	36	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R4	6	FRST	4	1367000	201.1	57.37	10.53	2.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R3	1	FRST	1	1	0.00626	0.00056	0.00008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.57	0.1706	0.3748
R3	1	FRST	2	1367000	8572	772	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R3	1	FRST	3	1	15	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R3	1	FRST	4	1367000	571.5	386	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FRST	1	1	0.01161	0.00108	0.00022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.75	0.1711	0.4695
R2	2	FRST	2	1367000	15870	1482	305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FRST	3	1	241	40	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R2	2	FRST	4	1367000	65.85	37.05	38.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
R1	3	FRST	1	1	0.0463	0.00517	0.00053	0.00006	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	33.96	0.1711	0.6255
R1	3	FRST	2	1367000	63310	7073	726	88	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
R1	3	FRST	3	1	522	135	34	17	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
R1	3	FRST	4	1367000	121.3	52.39	21.35	5.176	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	FRST	1	1	0.01616	0.00056	0.00004	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.01	0.05008	0.3462
W2	1	FRST	2	1367000	22100	767	55	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	FRST	3	1	446	89	24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
W2	1	FRST	4	1367000	49.55	8.618	2.292	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
W1	2	FRST	1	1	0.08533	0.01039	0.00090	0.00005	0.00001	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	41.08	0.1052	0.7377
W1	2	FRST	2	1367000	116700	14200	1240	76	17	3	1	0	0	0	0	0	0	0	0	0	0	0	0			
W1	2	FRST	3	1	628	294	100	25	10	2	1	0	0	0	0	0	0	0	0	0	0	0	0			
W1	2	FRST	4	1367000	185.8	48.31	12.4	3.04	1.7	1.5	1	0	0	0	0	0	0	0	0	0	0	0	0			
S9	1	FRST	1	1	0.09931	0.0139	0.00129	0.00004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24.26	0.1123	0.8511
S9	1	FRST	2	1367000	135800	19010	1768	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S9	1	FRST	3	1	602	216	35	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S9	1	FRST	4	1367000	225.6	88.02	50.51	9.167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	FRST	1	1	0.2964	0.06202	0.01058	0.00047	0.00026	0.00011	0	0	0	0	0	0	0	0	0	0	0	0	0	37.92	0.00229	1.846
S8	2	FRST	2	1367000	405300	84810	14470	649	364	154	0	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	FRST	3	1	171	195	67	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
S8	2	FRST	4	1367000	2370	434.9	216	129.8	121.3	154	0	0	0	0	0	0	0	0	0	0	0	0	0			
S3	3	FRST	1	1	0.3478	0.1113	0.02094	0.00171	0.00046	0.00030	0.00008	0	0	0	0	0	0	0	0	0	0	0	0	47.88	0.09443	2.257
S3	3	FRST	2	1367000	475600	152200	28640	2349	639	412	115	0	0	0	0	0	0	0	0	0	0	0	0			
S3	3	FRST	3	1	170	352	180	28	13	5	2	0	0	0	0	0	0	0	0	0	0	0	0			
S3	3	FRST	4	1367000	2797	432.5	159.1	83.89	49.15	82.4	57.5	0	0	0	0	0	0	0	0	0	0	0	0			
S6	5	FRST	1	1	0.00291	0.00004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.776	0.03366	0.2374

**BASIN: LOWER PUGET SOUND**

SIMULATION LENGTH: 39 YEARS, WATER YEARS 1949-1987

TIMESTEP: 15 MINUTES

NUMBER OF TIMESTEPS IN ANALYSIS: 1367424

NUMBER OF DAYS IN ANALYSIS: 14244

TABLE NUM

- 1 Fraction of total simulation time flows equal or exceed discharge level.
- 2 Total length of time discharge levels were equal or exceeded. Expressed in timesteps.
- 3 Number of excursions at each discharge level.
- 4 Average duration of each excursion in table 3. Expressed in timesteps.

### MODEL SCENARIO

FRST= Pre-developed land use (forested)

1987= 1987 (Calibration land use).

FH= Future land use without on-site det

SUB-BASIN	SCEN-TABLE:				DISCHARGE LEVELS (CUBIC FEET PER SECOND)																							MAX	MIN	MEAN
	RCH	ARTO	NUM	:	0	2	5	10	20	25	30	40	50	60	70	80	90	100	125	150	175	200	250	300						
S6	5	FRST	2	:	1367000	3989	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S6	5	FRST	3	:	1	28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S6	5	FRST	4	:	1367000	142.5	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S5	6	FRST	1	:	1	0.0696	0.00525	0.00026	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29.84	0.09264	0.6446			
S5	6	FRST	2	:	1367000	95170	7191	359	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S5	6	FRST	3	:	1	458	244	46	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S5	6	FRST	4	:	1367000	207.8	29.47	7.804	1.5	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
S7 CLSD DP	4	FRST	1	:	1xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx		
S7 CLSD DP	4	FRST	2	:	1xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx		
S7 CLSD DP	4	FRST	3	:	1xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx		
S7 CLSD DP	4	FRST	4	:	1xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx		
S4	7	FRST	1	:	1	0.1008	0.01159	0.00077	0.00004	0.00000	0.00000	0	0	0	0	0	0	0	0	0	0	0	0	0	38.07	0.115	0.8035			
S4	7	FRST	2	:	1367000	137800	15840	1060	55	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0						
S4	7	FRST	3	:	1	495	360	97	19	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0						
S4	7	FRST	4	:	1367000	278.4	44.01	10.93	2.895	1.833	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0						
S2	8	FRST	1	:	1	0.4609	0.2093	0.06784	0.01117	0.00555	0.00268	0.00071	0.00027	0.00013	0.00005	0.00001	0	0	0	0	0	0	0	0	85.82	0.3063	3.499			
S2	8	FRST	2	:	1367000	630200	286200	92760	15280	7599	3672	977	382	188	79	15	0	0	0	0	0	0	0	0						
S2	8	FRST	3	:	1	190	375	401	178	115	74	39	12	10	11	3	0	0	0	0	0	0	0	0						
S2	8	FRST	4	:	1367000	3317	763.1	231.3	85.82	66.08	49.62	25.05	31.83	18.8	7.182	5	0	0	0	0	0	0	0	0						
S1	9	FRST	1	:	1	0.4678	0.2136	0.07079	0.0123	0.00610	0.00293	0.00086	0.00029	0.00014	0.00007	0.00002	0	0	0	0	0	0	0	0	88.21	0.3153	3.573			
S1	9	FRST	2	:	1367000	639700	292100	96800	16820	8344	4009	1188	407	203	97	33	0	0	0	0	0	0	0	0						
S1	9	FRST	3	:	1	182	350	410	182	123	74	50	12	7	8	3	0	0	0	0	0	0	0	0						
S1	9	FRST	4	:	1367000	3515	834.6	236.1	92.4	67.84	54.18	23.76	33.92	29	12.12	11	0	0	0	0	0	0	0	0						

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